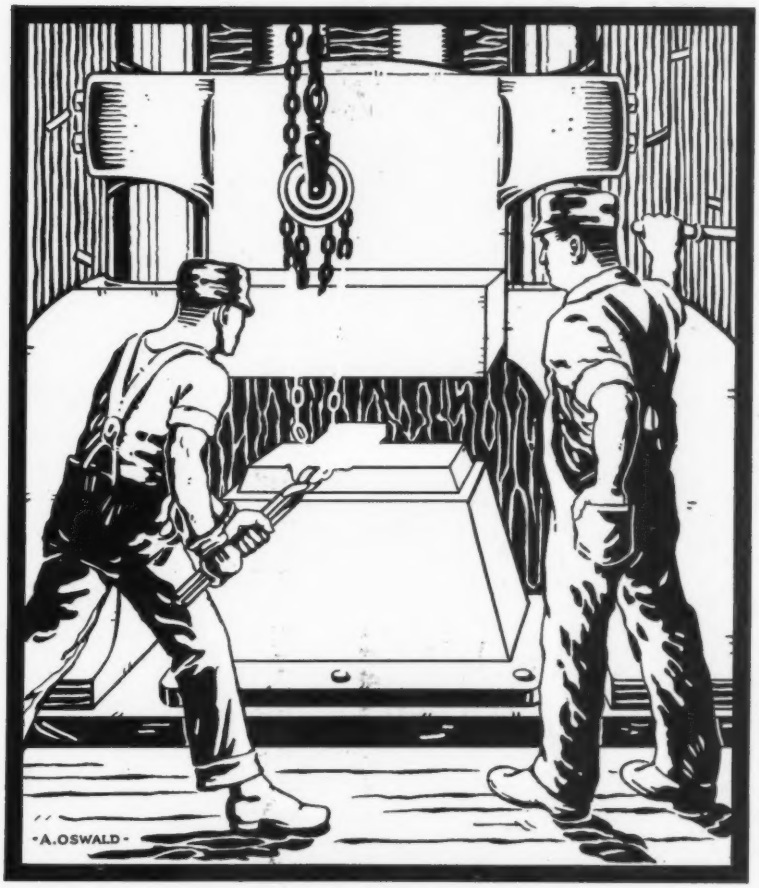
PERIODICAL ROOM
GENERAL LIBRARY
U. OF MICH.
OCT 18 1929

THE INDUSTRIAL ARTS MAGAZINE



NOVEMBER 1929

THE BRUCE PUBLISHING COMPANY
MILWAUKEE, WISCONSIN

ATKINS SILVER STEEL SAWS

MACHINE KNIVES, FILES, AND GRINDING WHEELS FOR THE MODERN SCHOOL SHOP

Save Time, Money and Material

Genuine Atkins SILVER STEEL Saws, Saw Tools, Machine Knives, Grinding Wheels and Files save money, time and material. They hold their keen cutting edge, and perform satisfactorily under the most difficult conditions, increasing the production and efficiency of the user.

When you need products as shown on this page, get the MOST VALUE for YOUR MONEY by specifying

ATKINS

A PERFECT SAW FOR EVERY PURPOSE

Send us your Saws to be repaired.

E. C. ATKINS & COMPANY

Established 1857 — ***The Silver Steel Saw People***

Machine Knife Factory: Lancaster, N. Y.

Home Office and Factory: INDIANAPOLIS, IND.

Canadian Factory: Hamilton, Ont.

Atlanta
New York
New Orleans

Seattle
San Francisco

Memphis
Chicago

Portland
Vancouver, B. C.
Paris, France

VOL. XVIII
No. 11

INDUSTRIAL-ARTS MAGAZINE

NOVEMBER,
1929

Published Monthly by

THE BRUCE PUBLISHING CO.

Eastern Office:
342 MADISON AVE.
NEW YORK, N. Y.

354-364 MILWAUKEE STREET
MILWAUKEE, WIS.

Western Office:
66 E. SOUTH WATER ST.
CHICAGO, ILL.

TABLE OF CONTENTS

Historic Background of Modern Vocational Education in the United States 407
Arthur B. Mays
New Orleans' Contribution to Vocational Education 409
Robert Brydon
A Course-of-Study Survey 412
H. D. Campbell
Making Design Function in School Life 414
Leon L. Winslow
An Interesting Activity for Architectural-Drawing Classes 416
Alex. J. Badger
Vocational Courses in Junior Colleges 417
Frederick L. Whitney
Some Methods of Handling Instruction Sheets 420
J. W. Bollinger
EDITORIALS: An Embarrassing Moment—Safety—Rules for Successful Work—Making the Student Think 422
The Industrial Unit in the New Senior High School, Fort Smith, Arkansas 424
A. E. Smith
Tinkering with Tinkers 427
D. C. Marshall
Wooden Toys in the School Course 429
F. Clarke Hughes

SUPPLEMENTS

Sewing Cabinet ..... No. 155
C. M. Rice
Coasting Bobs ..... Nos. 156 and 157
D. E. Kellogg and W. A. DeVette
Footstool ..... No. 158
Clifford B. Smith

POSTERS

The Flowing Tie 433
Earl L. Bedell and George Peacock
Work 434

PROBLEMS AND PROJECTS

Typical Job Sheet for the Auto Shop 430
Ray F. Kuns
Monkey Wrench 430
Alfred Grayshon
A Puzzle Board for Christmas 431
Raymond G. Steeves
The Wind Meter 432
D. E. Kellogg and W. A. DeVette
Copper Candle Sconces 435
Gerald A. Boate
Sewing Cabinet 435
C. M. Rice
Coasting Bobs 435
D. E. Kellogg and W. A. DeVette
Decorative Designs for Cards 436
D. Elizabeth Roberts
Magazine and Book Stand 437
J. I. Sowers
Whisk-Broom Holder 438
Edward Stein
Don'ts for the Electrical Shop 438
H. S. Rick
Tracing the Job Through the Printshop 439
Charles L. Detrick
Magazine-Basket Designs 439
Martin W. Peterson
A Fireplace Screen 441
R. M. Hammes
Suggested Problems in Sketching 442
Alfred G. Pelikan
A Mint Tray 443
Paul N. Wenger
How Industry Cuts Iron 443

Association and Convention Activities 445
Now, Are There Any Questions? 446
News and Notes 26a
New Publications 34a
School Shop Equipment News 36a
Among the Industrial-Arts Teachers 40a

THE A. V. A. CONVENTION

New Orleans, that old southern city, rich in the lore of the early days of colonization, Civil War, and of the southland in general, is inviting you to the 4th annual convention of the American Vocational Association on December 5, 6, and 7.

No doubt this convention will be the largest ever held by the American Vocational Association. Make arrangements to attend, and make these arrangements early, as the lure of the South is attracting many tourists during the winter months.

Everything seems to indicate that the convention will be a huge success. Take advantage of this educational opportunity and remember the convention dates, December 5, 6, and 7, 1929.

(The articles contained in the Magazine are regularly indexed in "The Reader's Guide to Periodical Literature," "Education Index," and "Current Magazine Contents."

Entered Jan. 2, 1914, as second-class mail matter at Milwaukee, Wis., under Act of March 3, 1879. Copyright, 1929, by Bruce Publishing Co. Title registered as Trade Mark in U. S. Patent Office, Jan. 16, 1917. Member Associated Business Papers and Audit Bureau of Circulations.

Subscription Information—Subscription price, $2.50 per year, payable in advance. Canadian and Mexican postage, 35 cents, foreign countries, 50 cents. Copies not over three months old, 25 cents; more than three months, 50 cents. Notices for discontinuance of subscription must reach Publication Office in Milwaukee, at least fifteen days before date of expiration. Changes of address should invariably include old as well as new address. Complaint of non-receipt of subscribers' copies cannot be honored unless made within fifteen days after date of issue.

Editorial Contributions—The Editors invite contributions bearing upon Industrial-Arts, Vocational Education, Manual Training, and related subjects. Manuscripts, drawings, projects, news, etc., should be sent to the Publication Office in Milwaukee. Contributions are paid for at regular space rates. In all cases manuscripts should be accompanied by full return postage.

The Magazine is on sale at Brentano's, New York; Wanamaker's, Philadelphia; Brentano's, Chicago; Philippine Education Co., Manila, P. I.

The CHOICE of INDUSTRY

In toolrooms and industrial laboratories—in the small machine shop and on the busy production floor—wherever accurate work of medium size is essential, you will find Seneca Falls STAR Lathes, for the majority of skilled mechanics prefer these fine tools. Many a master mechanic points with pride to his STAR and says: "This is the lathe my father taught me to use." And schoolmen, too, know the long history to Seneca Falls service. As Professor F. A. Fish, Head of the Department of Electrical Engineering at Iowa State College, writes:

> "The STAR Lathe which this department is using is one given to me by my grandfather about thirty years ago. I am glad to say that it is still giving good service."

Sentiment plays but little part in modern industry, but it inspires confidence to know that STAR Lathes have been rendering satisfactory service for four generations.

Write for descriptive literature and a copy of the free booklet "Star Witnesses"

SENECA FALLS MACHINE CO.

SENECA FALLS - - - - NEW YORK

THE INDUSTRIAL-ARTS MAGAZINE

Volume XVIII NOVEMBER, 1929 Number 11

Historic Background of Modern Vocational Education in the United States

Arthur B. Mays, Professor of Industrial Education, University of Illinois

PART I

VOCATIONAL education in some form has, of necessity, existed since the beginning of human life on the earth. To perpetuate life, the young must learn the means of sustaining it. Doubtless the young of primitive humanity acquired their life-sustaining knowledge and skills through unconscious imitation of the actions of their elders. Very early in the periods of organized society, however, such skills and knowledge were deliberately taught to youth by the tribal elders. The means employed were direct instruction in the "initiation" ceremonies, and conscious imitation while attempting to engage in adult activities. This last mode of learning is so closely akin to apprenticeship that it correctly may be called a primitive form of apprenticeship. In civilized life, from the earliest times, simple forms of apprenticeship have undoubtedly been the chief means of giving vocational education, though it seems probable, also, that during very early periods of human history, schools of some sort were conducted for those who were destined for the priestly vocations. That such schools existed among the ancient Egyptians and the Hebrews seems certain, and it is not improbable that they existed among other of the early peoples. Thus, by means of schools and various forms of apprenticeship, man has transmitted from generation to generation the necessary knowledge and skills to sustain life and to carry on the world's work.

Early Practices

From the earliest periods of civilized life to the closing years of the eighteenth century, there was little change made in the means of vocational education. Throughout those thousands of years the priestly callings, which to the present day have been the "learned professions," seemingly have been transmitted by means of some kind of school; and all other vocations, with the possible exception of the military vocation, have used some form of "learning by doing" as their chief mode of vocational training. Both these agencies, however, have undergone many modifications through the centuries. Apprenticeship seems, at first, to have been merely a father-to-son transmittal of skill and knowledge. Later, through the adoption of sons by artisans, the practice was enlarged and prepared the way for indentured apprenticeship as it was practiced in Egypt and other ancient countries shortly before the Christian era.[1] In the Middle Ages during the dominance of town life by the craft guilds, indentured apprenticeship became a most important social and economic institution. With the decline of the influence of the guilds, apprenticeship became a function of the state and continued as the most important means of vocational education for the skilled crafts until the development of the factory, which almost destroyed its usefulness. Through all the ages, however, there has been but one way for the unskilled worker to learn to do his tasks; namely, the "pick-up" method. It is only in very recent years that any serious attention has been given to the matter of training the common or unskilled laborer for his work.

Early Professional Education

For the learned workers, man has always recognized the necessity for careful education, and the teachers of such workers have in almost every case enjoyed positions of prestige and reverence. While it undoubtedly is true that much of the learning taught in the schools of philosophers, "wise men," prophets, and priests was not regarded as specific vocational education, the chief purpose of a large number of the earliest seats of learning was definitely vocational. In most cases the training given was designed to prepare for the priesthood or other official vocations. Among the Egyptians, special training was given to those destined for positions of importance as soldiers, priests, and scribes. The scribes constituted the accountants, stewards, secretaries, overseers, and managerial officials of various sorts. Their education was carefully looked after and was definitely regarded as vocational. Breasted, referring to the training of the scribes of the nobles of an early period in Egypt, says: "Connected with the treasury for whose multifold records so many skilled scribes were necessary, there were schools where lads received the education and the training which fitted them for the scribal offices. Learning possessed but one aspect for the Egyptian, namely, its practical usefulness. An ideal pleasure

[1] Arthur B. Mays, The Problem of Industrial Education (New York: The Century Co., 1927), Chap. II.

in the search for truth, the pursuit of science for its own sake, were unknown to him."[2] Describing further the vocational education of the scribes, he shows that when the boy had finally mastered the difficult skills of writing, he "was placed in charge of some official in whose office he assisted, gradually learning the routine and the duties of the scribe's life, until he was himself competent to assume some office at the bottom of the ladder."[3] This is strikingly similar to the modern practice of training professional workers. Erman indicates, however, that these boys were required early in their school career to work part of the day in the offices, their teachers being active officials. This suggests a typical part-time scheme of professional education.[4] Ebers indicates that the priests also were instructed in schools for their professional offices, including the practice of medicine.[5] That there were schools for the prophets among the Hebrews seems clear from various passages in the Bible.[6] These schools seem to have been informal brotherhoods or communities of the younger men who expected to become prophets and seers and they were presided over by some noted elder prophet. Somewhat later there appears a similar institution for the study of sacred law and for training in argument and interpretation. In these schools, groups of noted doctors of the law would meet daily in some public place, often, at Jerusalem, in a room of the Temple, where they debated and interpreted the law. There seems to have been a president or chairman of the group who propounded a subject or question upon which a qualified member of the group would discourse. These leaders, or teachers, sat upon raised seats and at their feet, on the floor, the young men and any others, ambitious to know the law, or to become doctors of the law, sat and listened and asked questions, occasionally engaging in the discussion.[7] This is doubtless the meaning of the assertion of Paul the Apostle that he was "brought up, in this city (Jerusalem) at the feet of Gamaliel, instructed according to the strict manner of the law of our fathers. . . ."[8] Gamaliel was a noted doctor of the law.[9] To designate the school education given by the Greeks and Romans as vocational is hardly justifiable, but that much of it, during certain periods of Greek and Roman history, was very definitely utilitarian is clear. This was certainly the case in the education of Spartan youth and seems to characterize the teaching of some of the Sophists at Athens who "professed to train young men for a political career."[10] The schools of rhetoric in Rome during the first century B.C. seem also to have been quite utilitarian in purpose though they were not definitely vocational. Hence, it appears that paralleling the traditional and seemingly universal practice of some form of apprenticeship as a means of training craftsmen, there were also, in certain cases, schools for the education of those who engaged in the learned vocations.

The European Universities

In medieval Europe, conditions were little different from those of the earlier periods of civilization. Unskilled labor learned by having to do; skilled craftsmen were trained through some type of apprenticeship; and the priestly or learned callings were provided for by means of schools supplemented by apprenticeship. The practice of the learned professions were so thoroughly identified with the learning and the culture of the period that it is difficult to draw a line between education for culture and specific vocational education, but that the purpose of the early European schools and universities was utilitarian, if not definitely vocational, seems clear. The first three universities of Europe appear to be chiefly professional, certainly in the early years of their history. The first such institution was that at Salerno, near Naples. Salerno was for centuries famous as a health resort because of its medicinal waters, and it is not surprising to find a medical school growing up there quite early. Salerno was known as a school of medicine as early as the ninth century, and indeed never became more than a medical school, though it is sometimes referred to as the University of Salerno. It was recognized in 1231 as the school of medicine for the university created by Frederick II at Naples in 1222.[11]

The next school of higher learning to be established primarily for professional education was the University of Bologna, which was chartered by Frederick Barbarossa in 1158, though it had been in existence for many years previous to that date. Its chief work was the teaching of Roman civil law and of Canon law. Later, faculties in medicine and theology were added. Next came the University of Paris which was originally, and continued to be for centuries, preëminently a school of theology. Paris, however, also had faculties of liberal arts, medicine, and law. It was chartered in 1200 by Philip Augustus, long after its founding. Thus it appears that the first three schools of higher learning in Europe were predominantly professional in purpose.[12] It is interesting, however, to note that the ancient idea of craft apprenticeship as the means of preparing one for his vocation influenced greatly the early forms of university organization. Much of the terminology used by the early medieval craft guilds is found in the university, and its legal status was almost identical. The three stages of student, bachelor and master, or doctor, probably were conscious imitations of the craft apprenticeship scheme of apprentice, journeyman and master. Monroe's Cyclopedia says of this likeness, that "We may say that the ruling idea of medieval university organization was that of a trade or craft guild, with its system of apprenticeship developed through journeymanship into master, its corporate rights and its corporate responsibilities.[13] Many European universities of later dates were modeled either on the pattern of

[2]James Henry Breasted, A History of Egypt (New York: Charles Scribner's Sons, 1912), p. 98.
[3]James Henry Breasted, A History of Egypt (New York: Charles Scribner's Sons, 1912), p. 100.
[4]Cf. Adolph Erman, Life in Ancient Egypt (New York: Macmillan and Co., 1894. Tr. by H. M. Tirard), pp. 332–333.
[5]George Ebers, Uarda (New York: A. L. Burt Company, 1876), pp. 22–29.
[6]See I Sam. xix. 20; II Kings ii. 3; II Kings ii. 5–15; II Kings iv. 38; II Kings vi. 1.
[7]For detailed description with Talmudic sources, see Bible Encyclopedia and Scriptural Dictionary (Chicago: The Howard-Severance Company, 1913), Vol. III. Schools. Education.
Also see, H. Graetz, History of the Jews (Philadelphia: The Jewish Publication Society of America, 1902), Vols. I and II.
Also see, H. Polano, The Talmud (Philadelphia: Leary's Book Store, 1876), Introduction.
[8]II Acts xxii. 3.
[9]Acts v. 34.
[10]Frank Pierrepont Graves, A Student's History of Education (New York: The Macmillan Company, 1918), p. 17.

[11]Encyclopaedia Britannica, Vol XXVII, "Universities."
[12]For descriptions of the work of these institutions, see any college text on the history of education covering medieval Europe, or any general reference work on education, or Encyclopedia Britannica.
[13]For a detailed discussion of the corporate character of medieval universities, see "Universities," Monroe's Cyclopedia of Education, Vol. V.

Paris of Bologna, and to the present time are essentially professional in their purpose.

In the United States the history of vocational education down to the close of the first quarter of the nineteenth century was little different from that of Europe through the Middle Ages. In the earliest period of American history, some form of apprenticeship constituted the chief means of training for all but the common laborer, but efforts were made almost from the first to provide some sort of school for the learned professions. Harvard College, which opened in 1638, was originally and primarily a school for the training of Christian ministers, though a special professorship in theology was not established until 1721. The other early North American colleges were also established primarily for the training of ministers. As the character of the economic and social life of the country changed, the universities gradually expanded, but they developed primarily as professional schools. The lines of their growth were much alike and that of Harvard is typical. It is indicated in the following: A medical school was established in 1782; a law school in 1817; a divinity school in 1819; a dental school in 1867; a graduate school of business administration in 1908; and a graduate school of education in 1920.[14] However, throughout the colonial period and the first century of the history of the Republic, the chief means of training men for the professions was a sort of apprenticeship. Young men attached themselves to some outstanding member of the profession which they wished to enter and by studying under his direction and aiding him in his professional duties, they came, in course of time, to acquire the necessary knowledge and skill to begin independent practice. Most of the ministers, lawyers, and doctors were trained in this manner from the beginning of American history to the early years of the present century. Nevertheless, during that entire time, the need for professional schools was realized and many such schools were founded and maintained. Not a few such institutions grew up around the private teaching of prominent men engaged in the professions. As these private institutions grew in importance and influence, the universities began, in ever-increasing numbers, to add professional schools to their organizations. In several notable cases, private professional schools were taken over by universities, becoming departments or colleges within the larger institution. In such fashion did vocational education for the three ancient, learned professions become permanently established as a phase of school education, rather than merely as a special type of apprenticeship.

(To be continued)

[14] See, A Cyclopedia of Education. Monroe, "Harvard University," for detailed account of Harvard and other old American universities.

New Orleans' Contribution to Vocational Education[1]

Robert Brydon, Isaac Delgado Central Trades School, New Orleans, Louisiana

PART I

AS elsewhere in America, New Orleans, that ancient metropolis of the far south, is fast changing its predominating interests from agricultural to industrial. Time was, and that not so very long ago, when the success or failure of the cotton, sugar, and rice crops of the state of Louisiana, and adjacent territory, was immediately and very definitely felt throughout the various avenues of life in the city. Now, however, while the fortunes of these staple crops still influence the business of the city, the advent in ever-increasing numbers of industrial concerns makes the necessary adjustments due to agricultural fluctuations easy to accomplish.

These industries have in their turn presented their own problems, one of the most characteristic of which is the demand for properly trained skilled mechanics and tradesmen in this community.

New Orleans' reply to this demand was one of the finest trades schools in the United States, the Isaac Delgado Central Trades School, now in its ninth year of successful operation.

That this school, in its brief life, has fully measured up to its responsibilities, and in a large way shouldered the burden of supplying local industries with well-trained craftsmen, is easily verified. Its graduates and former undergraduates, now number in the thousands. They have gone out, not only into the city of New Orleans, but into the other cities and towns of the state and neighboring territories of the south. Many of them are successfully holding executive positions and offices of trust and responsibility. Others have risen above the status of journeyman and are now rated as experts in their respective lines. Still others have successfully branched off into allied lines, and all this because of the training in the fundamentals of the crafts which they received at this school.

This institution has been uniquely favored, ever since that benevolent philanthropist, Mr. Isaac Delgado first conceived the idea of building such a school for the benefit of the young men of New Orleans.

Before his death in 1912, he incorporated in his will a bequest sufficient to defray the expense of purchasing the ground, erecting the building, and equipping the school he had in mind. This bequest was in the form of Liberty Bonds and a valuable sugar plantation located in St. Mary's Parish, Louisiana, about 150 miles from the city, in the very heart of the "Evangeline" country.

It was while the plans for the school building were being made that the world war brought to an abrupt end, any further consideration of the project. But there was a silver lining to the war clouds, for when the plans for the school were again considered at the close of the hostilities, it was found that the war prices on sugar had added considerably to the balance in hand to be expended upon the projected school.

Mr. Ed. A. Christy, city architect of New Orleans, made a nation-wide tour of inspection of all the then existing trade and industrial schools in order to incorporate the most approved ideas in his plans. How wisely he planned, time has abundantly proved, for though the school courses and departments with their

[1] This article will be of special interest to the readers of the INDUSTRIAL-ARTS MAGAZINE because of the coming A. V. A. convention at New Orleans on December 5, 6, and 7.

corresponding allotments of space have been changed from time to time, yet the original layout of the building has proved quite adequate, and sufficiently elestic to take care of the overflow which time has brought with it.

The then mayor of the city, the late Honorable Martin Behrman, deserves great praise for overriding local political interests when the matter of selecting a head for the new trade school was considered, and insisted upon securing a man who was experienced in just this kind of work. This, of course, meant that an out-of-town man must be chosen. It was thus that after considering the qualifications of some forty applicants, Mr. H. Giles Martin, graduate in electrical engineering of the University of Missouri, and for ten years assistant superintendent of the David Ranken School of Mechanical Trades in St. Louis, Missouri, was selected as director of the Delgado Trades School in New Orleans. The never-flagging success of the school is directly attributable to his wise administration. In his early student years, Mr. Martin was one of those fortunate young men who had to struggle to win his way upward to his scholastic goal, and it is this experience which now, after the lapse of years, brings with his administration that true sympathy for the struggling student which inspires the New Orleans boy to carry on and win in spite of obstacles.

H. G. MARTIN
Director, Isaac Delgado Central Trades School, New Orleans, Louisiana

Under the terms of Mr. Delgado's will the affairs of the school were to be under the general supervision, not of the city school board, but of a special board of directors to be appointed from the city school board, and the educational, industrial, and commercial interests in the city. It is to this composite board of directors that credit must be given for the true reflection of the combined vocational and educational needs of the city in the curricula of the school.

Fortune again favored the school when the matter of selecting the corps of trades teachers was taken up, for just about that time, the U. S. Naval Station, which for several years had been in very active operation, was reduced by the Navy Department to an almost inactive status, thus throwing out of employment many highly trained tradesmen of various lines, including many of the executives and heads of departments. It was from the ranks of these that many of the present members of the school faculty were recruited. These men were immediately incorporated into a teacher-training class, conducted by the director, Mr. Martin. Other teacher-training courses followed, and many of these instructors are now far advanced in the course of study leading to degrees in Tulane University.

MR. DELGADO'S PLANTATION HOME, ALBANIA PLANTATION, ST. MARY'S PARISH, LOUISIANA

While it might not be proper at this time to go into a detailed description of the building, etc., some of the features of the building and conduct of the school which have proved especially successful would probably be fitting.

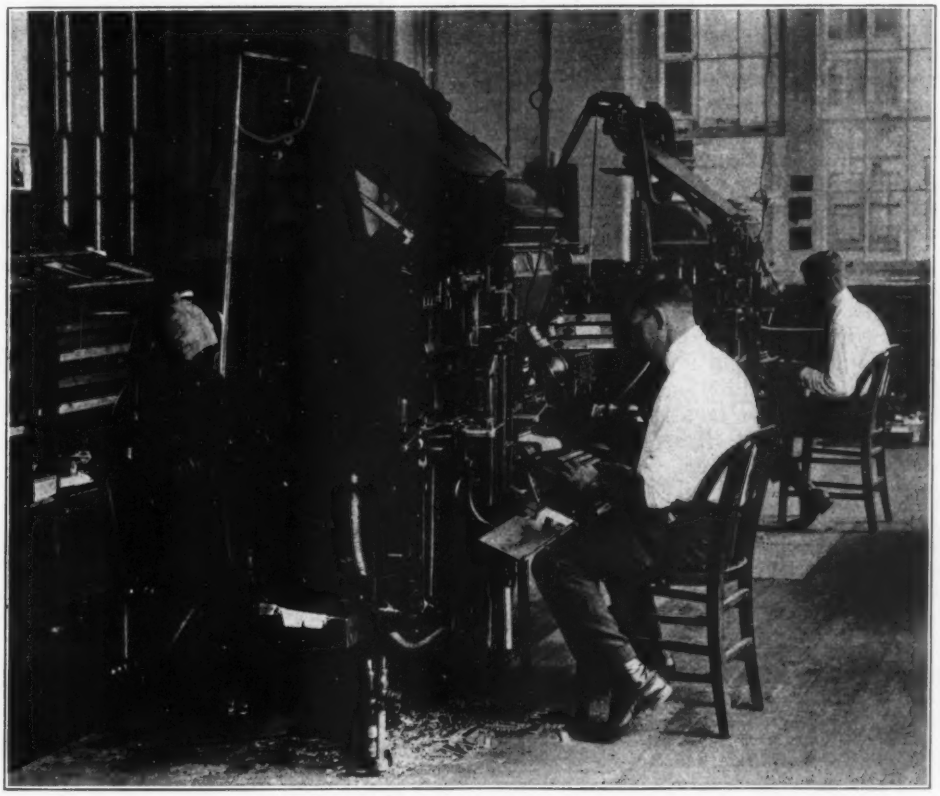
One might feel that a trades school should be located among, or at least close to, already established industrial plants. Fortunately, however, such was not the selection of the board, for they chose a site adjacent to City Park with its many ancient live oak trees, art museum (the latter also Mr. Delgado's gift to the city), beautiful flowering plants, and its bayous with their graceful swans and other water fowl. In such beautiful quiet surroundings the school has the advantage of the wide open spaces, acres of green grass, pure air, and an abundance of sunshine. Industrial contact is obtained, however, by frequent visiting trips to the industries, and by bringing the industries into the school where the beautiful and spacious auditorium is available for industrial lectures, conventions, etc.

The cost of the school complete ready for occupancy was over a million dollars. The purchase price for the tract of land, comprised of fifty-seven acres, was $178,000, the building $725,000, and the equipment, machinery, tools, etc., about $200,000.

A CORNER OF THE FURNITURE SHOP, ISAAC DELGADO CENTRAL TRADES SCHOOL, NEW ORLEANS, LOUISIANA

The building consists of 4 three-story rectangular units built corner to corner thus forming a hollow rectangle, the wide court in the middle affording light and air to what would otherwise be inside shops. The four buildings are connected by continuous corridors on each of the floors. There are service elevators in each of the rear corners and stair wells at each of the four corners.

The front building extends 330 ft. along City Park Avenue. It is set back about 100 ft. from the street, and contains the administrative offices, school library, auditorium, and classrooms. Two shop units form the right and left wings, each of which contains three



A SMALL PORTION OF THE PRINTSHOP OF THE ISAAC DELGADO CENTRAL TRADES SCHOOL, NEW ORLEANS, LOUISIANA

large shops, which are subdivided into smaller shops as needed. The fourth or rear building is devoted to two large shops, locker, and washrooms, and to the school cafeteria. The heating plant, shipping and receiving department, custodial equipment, etc., are housed in a one-story annex at the rear of the school building.

A very pleasing feature of this building plan and one of the first to strike the visitor, is the open-front office arrangement. The stranger entering the front door has not a moment's doubt as to what he is to do, for he can tell at a glance that he is expected to advance straight ahead, up the broad center stairway, which opens directly into the general office where a clerk awaits to give him immediate attention. The administrative offices are clustered around the general office, among them being the office of the state supervisor of trade and industrial education.

The auditorium on the third floor, spacious and beautiful, surpasses anything of its kind in New Orleans. It comfortably seats about 1,000 persons and has a stage at one end equipped with dressing rooms, several sets of scenery (painted by the students of the fresco painting department), and an electrically operated curtain. This auditorium is used mainly, of course, for school functions, but is also frequently made use of by nonschool groups and industrial organizations.

(To be continued)

AN INTERIOR VIEW OF THE PLUMBING DEPARTMENT, ISAAC DELGADO CENTRAL TRADES SCHOOL, NEW ORLEANS, LOUISIANA

A Course-of-Study Survey

H. D. Campbell, J. S. Morton High School, Cicero, Illinois

THE following questionnaire was sent to 62 chief draftsmen, for the purpose of obtaining their evaluation of the elements of the traditional course of study so commonly followed in mechanical-drafting classes. In order to get a more definite reaction, a substitute course was submitted for criticism.

Fifty replies were received and the results are given further on.

A number of those replying suggest improvements or additions or made comments which may be of interest

While the material accumulated may or may not influence the teaching of the individual instructor, depending upon the purpose for which drafting is offered in his school, it is hoped that it will be of value as an expression of the point of view of the employer.

The Questionnaire

1. Would you prefer an applicant to have studied drafting in school? _____
   Would you prefer to train him yourself? _____

2. The orthodox course consists of the following taught about in the order given. *Check those items you consider essential to a start on the board.*

   a) Lettering, slant, lower case, and caps. _____
   b) Geometrical construction (from 10 to 30 problems). _____
   c) Third-angle projection. _____
   d) Developments (sheet-metal patterns). _____
   e) Triangulation (transition from square to round in above). _____
   f) Intersection of solids. _____
   g) Conic sections. _____
   h) Isometric projection) _____

i) Oblique projection) Instrumental. _____

j) Cabinet projection) _____

k) Cams. _____

l) Gears (some or much time spent on tooth profiles). _____

m) The helix. _____

n) U.S.S. bolts and nuts. _____

o) Machine details; hand wheel, pulley, coupling, etc. _____

p) A detailed working drawing. _____

The earlier part of this course is usually finished in pencil on detail paper. The latter part is finished in ink on detail paper. The last problem (*p*) is drawn in pencil and then traced on cloth. There is usually a correlation of shopwork with the drafting practice.

3. The following is a tentative course of study intended to prepare our two-year vocational graduates for entry into local industry.
   a) Lettering, slant, caps only.
   b) Geometrical construction 8 or 10 useful constructions).
   c) Third-angle projection.
   d) Intersection of solids and voids.
   e) Isometric sketching. The first few instrumental, the rest free-hand.
   f) Cams.
   g) Gears (*no tooth profiles*).
   h) Fasteners; bolts and nuts; cap, machine, set-screws; rivets; keys, etc.
   i) Details; wood, machine, pipe, etc.
   j) Practical problems of design.
   About one fourth of the time to be spent on the fundamentals in (*a*), (*b*), (*c*), (*d*), (*e*); another one fourth of (*f*), (*g*), (*h*), (*i*); the remaining one half to be spent in applying this information on (*j*). In doing so, an advanced student is to act as squad leader and designer, to supervise detailers and tracers, check drawings, prepare material lists, etc.
   All preliminary drawings to be in pencil on detail paper or direct on tracing paper. All finished drawings in ink on tracing paper. Some training on cloth.
   Drafting students to study patternmaking and machine-shop practice.
   Check the course of study you prefer, 2_____ *or* 3_____.
4. What subjects not listed would you like added to the above?
   _____
5. Comments:
   _____

The Results

	Per Cent
1. Prefer applicant to have had school training.	86
Prefer him to receive all training while employed.	02
Prefer to combine school and shop training (apprenticeship, etc.)	12
	100
2 Relative importance of parts of course of study according to the replies:	
a) Lettering.	96
b) Geometrical construction.	96
c) Third-angle projection.	98
d) Developments.	84
e) Triangulation.	66
f) Intersections.	90
g) Conic sections.	60
h) Isometric projection.	40
i) Oblique projection.	26
j) Cabinet projection.	20
k) Cams.	66
l) Gears.	48
m) Helix.	54
n) U.S.S. bolts and nuts.	84
o) Machine details.	88
p) Detailed working drawing.	96
3. Prefer course outlined under 2.	06
Prefer course under 3.	86
*Checked both course 2 and course 3.	04
Checked neither.	04

4. Suggested additions were:
   a) Add free-hand sketching. Use actual machine parts. Sketch each piece before detailing it.
   b) I would add free-hand sketching upon which a considerable amount of time should be spent.
   c) A large part of the drawings made in our drafting room are used for factory estimates only and do not get as far as production. A free-hand sketch is sufficient in most cases but we find few draftsmen who can adapt themselves to sketching. More study in this line would be advantageous, in my opinion.
   d) Would suggest quite a bit of shop mathematics and trigonometry.
   e) Course should include figuring triangles and bevel and spur gears.
   f) Would suggest that the calculation of weights and the location of the center of gravity be added.
   g) Add trigonometry in the solution of triangles.
   h) The strength of materials and graphostatics should receive more attention as these subjects are essential in order to properly design.
   i) Add the entire design of a machine. The student should figure torsion on a shaft, bending, gear-tooth loads, flywheel energy, etc.
   j) Add something of drafting-room practice as to numbering drawings, preparing lists of parts, and caring for engineering changes.
   k) Add material specifications, drafting-room systems, bills of material.
   l) The only suggestion the writer could make to improve the above would be to have a supplementary course specializing, to some extent, in the work of a particular industry which might be prominent locally and offer ready chances for employment to the graduate. For example, if electrical manufacturing concerns offer near-by prospects for employment, a supplementary course should be developed, specializing in wiring diagrams, coil construction, magnetic circuit lay-outs, etc.
   m) Would include a general outline of structural detail in steel, inasmuch as the course is general.
   n) Add the advantages and application of different forms of power, electrical, hydraulic, pneumatic, and steam.
   o) Add the keeping of instruments in first-class condition.
   p) Add the consideration of pattern and die problems when making detail drawings; also the consideration of foundry problems.
   q) Considerable time should be spent on the subject of interchangeable manufacture, tolerances, and the proper arrangement of dimensions on a drawing.
   r) I believe it would be a good thing to work in a good deal of jigs and fixtures on the practical problems, pointing out the necessity for simple, sturdy, quick-acting, accurate and foolproof jigs and fixtures.
5. Comments were:
   a) I do not favor drawings left in pencil on detail or tracing paper unless they are to be used only once. All drawings of importance ought to be traced on cloth. A blue print from a pencil tracing is a poor thing at best. The tracing may be improved by going over the lines a second time, thus making a fairly clear print. If the extra time were expended in making an inked tracing on cloth, the results would be 100 per cent

*Both men said, "2 best for technical high school, 3 for a trade school."

better and the cost but little more. Cloth tracings can be carefully preserved, but drawings on paper are so easily torn in handling that they are usually found in poor condition when wanted.

b) Most concerns are adopting paper in lieu of cloth.

c) We use paper in most of our tracing work.

d) *No* ink work on *tracing paper*. A draftsman should be good at inking in, of course, but little of it is done nowadays. Pencil on vellum is more common. Would put practical problems ahead of ink work or lettering.

e) Would suggest plenty of practice in lettering.

f) Spend more time on lettering and tracing work.

g) Emphasize the importance of lettering.

h) Would suggest actual pattern-shop, machine-shop, and toolroom work until student can do a passable job without help, working entirely from drawings, and is thoroughly familiar with the use of the usual tools employed.

i) Would prefer to have students receive more practical shopwork as well as a thorough drafting-room course.

j) It is understood that a boy must have had practical training of some sort in the mechanical trades; i.e., machine shop, pattern shop, forge shop, or foundry. His progress will be much more rapid in the drafting room. Time spent at the trades repays itself many times over.

k) Combine the geometrical constructions in a detail drawing. Give some problems from written directions.

l) We have been cutting down our text (used in company apprentice school) on geometric construction. It originally contained thirty problems and now contains only twelve.

m) About the only excuse the writer could ever see for the large amount of time spent on gear profiling was the practice it gave the student in the handling of instruments.

n) The average man lacks more in initiative and power of concentration than in mechanical ability. We try to develop sound thinking and reasoning (in factory school).

o) The scheme of using students alternately as group leaders and detailers is good. I presume that in the former capacity they check the completed drawings as well as supervise the drafting.

p) It has been the writer's experience that draftsmen tend to become specialists and that their final path of advancement follows certain lines to the point where the draftsman becomes an engineer, specializing in a particular business. It has been the writer's advice to young draftsmen to make every effort to stick to one field, as by so doing they will rise from draftsman to engineer with better remuneration and better chance for permanent employment. I have always felt that the majority of drafting courses missed altogether the desirability of specializing in some one field with that end in view rather than teaching drafting as an end unto itself.

q) Most high-school students come to us with the idea of becoming draftsmen, as though such a job were a vocation. We have to point out that the mere matter of making a picture of a piece of mechanism on paper can be taught to anyone, girl or boy alike. The ultimate goal to which a draftsman should aim is that of designer. In this respect he should have certain natural qualifications such as inventive ability, imagination, and mechanical instinct. Only men possessing these qualifications can expect to get a real compensation in the matter of wages.

Criticisms of the tentative course of study were:

a) The above is a fairly good course for beginners in drafting.

b) Course very well laid out.

c) Outline O.K.

d) Course No. 2 is O.K. for a school, but not for a factory drafting course.

e) Course looks fine.

f) The plan of work looks good to me.

g) You seem to have the right idea.

h) I do not believe the course makes much difference. The thing to teach the student is neatness, speed, good lettering, and the ability to make good-looking drawings.

i) I think you have a very good course.

j) Very good plan.

k) Very good.

l) Looks very practical.

m) Seems enough for young men of high-school age.

n) No. 3 the more practical.

o) No. 3 is too advanced.

p) The writer is very much in accord with the course under 3, and agrees that 2 does not give a student the best practical training.

q) Particularly good. The more time boys spend on practical work, the better they are adapted to be of help when employed in a drafting room.

Making Design Function in School Life

Leon L. Winslow, Director of Art, Department of Education, Baltimore, Maryland

DESIGN principles should be emphasized and made use of throughout the entire curriculum, for design implies orderly arrangement not only in pictures and in decorations, but also in arranging written and printed matter upon the paper, and in the displaying of notices on the school or classroom bulletin board.

Most people would be much disturbed if they were required to read a printed newspaper or magazine page in which there was but a single margin at the left. And yet this arrangement in writing is precisely the one which many of us adults were taught to observe in school, and in which some of us still persist. "Margins on both sides of the sheet," writes Dr. Henry Suzzallo, "facilitates reading which is the basic utility of letter writing. It stops the swing of the eye well in advance. It gives a shorter line which is much easier to read than the long line. In addition it is art. The only gain in destroying the right-hand margin is an economy of paper, one which commercial practice does not sanction." The saving in paper to be realized by using a single margin at the left is negligible when one considers that this margin may be divided, half of it being reserved at the left edge and half at the right edge of the paper. What at first appeared to be a saving of paper is really no saving at all.

The following suggestions governing the preparation of written work will be helpful to the teacher who desires more specific directions: (1) Unruled paper should be preferred for most schoolwork; paper having horizontal rulings may be used if desired. (2) Papers should not be folded. (3) Both sides of the sheet should be used. (4) No paper having vertical rulings should be used for ordinary schoolwork. (5) When one side of the paper has been filled, the sheet is turned by revolving it about the left-hand edge as an axis. (6) The placing of titles should follow the commercial practice; the entire title should be centered on the page, from left to right, the main title appearing high-

est, followed by the name of the writer, placed just below, followed by other subordinate data placed still lower. (7) Equal margins should be observed at the left and right edges of the sheet. (8) If the pages are to be bound, allowance should, of course, be made for binding.. (9) Loose sheets should be numbered near the upper edge in the center of the sheet from left to right; commercial practice should be followed in the numbering of bound pages.[1]

The appearance of written work on blackboards is another matter which seldom receives the attention that it deserves. Although the blackboard is usually continuous, nevertheless its surface should be broken up into smaller rectangles which can be considered as units for writing, just as a sheet of paper is a unit.

FIG. 1. THE SCHOOL BULLETIN BOARD BEFORE THE SUGGESTION THAT AN ARTISTIC ARRANGEMENT MIGHT IMPROVE THE APPEARANCE AND INTEREST OF THE MATERIAL. FIG. 2. TWENTY MINUTES LATER

Sometimes the pieces of slate making up the continuous blackboard are regular in size and shape. If so, these divisions will define the rectangular unit. Now, the same rules for arrangement that we applied in the

[1] H. T. Bailey, Art Education, pp. 35-44 inclusive, Houghton Mifflin Co.

arrangement of writing on paper can be made also to apply to the individual spaces of the slate blackboard.

Closely allied with the disposition of written work on the blackboard is the arrangement of parts involved in posters, notices, and other reference material placed on bulletin boards. Here, however, the problem deals with the placing of given elements which are already complete in themselves rather than with creating and arranging carried on simultaneously as in writing. Bulletin boards are for the display of notices and of other transitory or semipermanent informational material; they are not for the display of pictures which shall serve as permanent decorations.

A glance at the accompanying illustrations will convince one of the importance of order in bulletin-board arrangement. Figure 1 shows that little thought was given to this matter of arrangement. The things put up for display appear quite as if they had been thrown against the wall. The one redeeming feature is that all are right side up. They might have been hung by one corner, diagonally. This indeed is sometimes done. From the art standpoint the bulletin board is perhaps "average." There are today in the public-school buildings of Baltimore many boards that are worse in appearance and, we trust, many that are better.

Figure 2 shows the same bulletin board just twenty minutes later by the school clock, after the material had been rearranged.[2] The pupils helped in this rearrangement. It will be noted in this picture that the vertical and horizontal lines of the room have been emphasized, and that diagonal lines have been avoided. The structure of the bulletin board itself has been respected. No notices have been allowed to project over the frame. A center of interest has been established near the center of the board, just where it should be. The notices have been grouped in such a way that they appear to hold together in a sort of friendly unity. The entire display is *balanced*, that is, each part keeps its place in the design, and the whole gives one a feeling of fitness, appropriateness, and satisfaction far in excess of that produced by the haphazard arrangement as shown in Figure 1. Furthermore, the notices have been arranged on a vertical axis. A slight vertical center line drawn in crayon or pencil will be found a great help in putting up the notices from day to day as they come in. This makes it easy to produce a balanced design.

In beginning to arrange notices on a new bulletin board or rearrange them on an old one, it is best to start by placing the first notice on the vertical center line, slightly above the exact center of the board. The second notice is placed directly below the first. Then the additional incoming notices are placed to the left and right respectively in order to produce and to retain a balanced arrangement. If an odd number of notices are to be posted, then one notice can be placed at either side of the one centrally placed. If an even number is to be displayed, one of those in the center may have to be moved either to the left or to the right, temporarily leaving an open space. All notices should, of course, be taken down when they have served their purpose. This will make for improvement in the board's appearance, and it will at the same time help to simplify the problem of balancing the arrangement.

If the method of bulletin-board arrangement herein discussed is followed consistently, it is scarcely necessary to point out that as old notices are put aside and new ones added, the balanced appearance of the arrangement can always be maintained if a little attention is paid to the rules laid down in the foregoing.

[2]It will be noted that there appears to be one less notice in the rearrangement. One of the notices, being a two-page document, the second page was posted directly under the first which was then left unattached at the bottom in order that it could be lifted for reading. This solution of the problem is often desirable.

EDUCATION

We have come to see that education consists in doing things. In more general terms, we define education as a preparation for participation in life's activities and the ability to meet the demand that society places upon an individual.—*C. F. Klinefelter.*

DYNAMIC MOVEMENTS IN ART

Architecture, designing of women's costumes, and commercial art as reflected in advertising are the only dynamic movements in the present-day expression of the useful arts in America.—*C. R. Richards.*

AN INTERESTING ACTIVITY FOR ARCHITECTURAL-DRAWING CLASSES

Alex. J. Badger, Lincoln High School, Los Angeles, California

A feature of the recent annual architectural exhibit in Lincoln High School, Los Angeles, was a group of miniature model houses, each on its own lot and completely landscaped, with lawns, trees, shrubs, vines, and gardens. The whole represented a typical residence block. Models such as these are always attractive in a school exhibit and provide a welcome addition to the customary architectural drawings executed by the students, which are sometimes unintelligible to the layman.

The models were made of bristol board, the elevation stretch-outs being first drawn at a scale of ¼ in. to the foot, then cut out and folded, the roofs fitted on, and the whole mounted on pieces of wallboard the size of typical city lots. Corrugated paper furnished excellent tile roofing, while sawdust and bits of sponge, with the aid of poster paint, provided lawns and shrubs. A successful vegetable garden boasted toothpick onions and paper-wad cabbages. Radio aerials and clotheslines added bits of realism.

The construction of such models provides a practical and an interest-holding activity for any architectural-drawing class, and the attraction and appeal of the completed miniature houses is universal.

ARCHITECTURAL MODELS MADE BY STUDENTS OF A. J. BADGER IN THE LINCOLN HIGH SCHOOL, LOS ANGELES, CALIFORNIA

Vocational Courses in Junior Colleges

Frederick L. Whitney, Director, Department of Educational Research, Colorado State Teachers College

A RECENT nation-wide investigation of the American junior college[1] has disclosed the existence of 146 such institutions which are publicly supported, and 236 which are under private control. The curriculums of a representative sampling of both types of schools were analyzed for the details of content, and the findings are shown herewith.

In Arts Colleges

The junior colleges selected for this curriculum study were all making offerings of the liberal-arts type; that is, the major portion of their courses seemed to tend toward general cultural objectives rather than toward more specific occupational ends. It is not meant by this that they aimed to perform a terminal function. On the contrary, as a rule, they appeared to look toward a continuation of a similar type of education in the junior and senior years of higher institutions of learning.

But the analysis of curriculum offerings revealed, among the nineteen course groups found, at least four which may have vocational or occupational objectives. These are agriculture, education, engineering and industry, and commerce. These courses are selected as possibly vocational, not only on the basis of general knowledge, but because in many of the junior-college catalogs specific statements are found which point out the desirability of such courses as direct preparation for life occupations, or as contributing to a further preparation for given types of employment or for the professions.

An examination of the material gathered for this analysis, shows that four courses in agriculture are listed in one college, the one yielding the greatest credit being a six-hour course in animal husbandry. Under education, 22 course titles are found, those with the greatest frequency being observation and practice. These are offered in two public and six private junior colleges. Under so-called industrial subjects, ten titles are listed, the one occurring most frequently being descriptive geometry. This study is offered in five public junior colleges. Commercial subjects to the number of 21 are found, the one offered most frequently being principles of accounting. This is listed in the catalogs of five public junior colleges.

The relative importance of these four course groups among the nineteen found in all junior-college curriculums studied is indicated in Table I. Here it is seen that, as to the average number of semester hours offered, commerce takes the lead, and education comes second. Columns 5, 6, and 7 show that but half of the colleges offer education courses, eight or nine out of thirty have industrial and commercial offerings, and but one has any agricultural work. However, in terms of total curriculum offerings, it is seen in columns 8, 9, and 10, that one of these groups constitutes very large proportion of the entire curriculum, the largest being commerce, which, however, totals less than 10 per cent of the whole.

[1] F. L. Whitney, The Junior College in America. Colorado Teachers College Education Series No. 5, June, 1928.

TABLE I

Curriculum Emphases in Four Vocational Course Groups in Fifteen Public and Fifteen Private Liberal Arts Junior Colleges, 1927-28

Subjects	Average No. of Semester Hours			No. of Colleges with no Courses			Average % of Total Offering		
	Public	Private	Total	Public	Private	Total	Public	Private	Total
1	2	3	4	5	6	7	8	9	10
1. Agriculture		1.2	0.6	15	14	29		0.4	0.2
2. Education (teacher training)	10.1	17.7	14.7	9	6	15	4.8	6.2	5.8
3. Engineering and Industry	10.2	0.0	5.1	7	15	22	4.8	0.0	2.0
4. Commerce	21.2	30.0	25.7	10	13	23	9.9	10.4	9.4
Approximate Median	10.0	10.0		10	13		5.0	3.0	

It may be assumed, then, that in the rather general curriculums of the arts colleges the vocational element is not strong. It is lacking entirely in from 15 to 29 out of the 30 studied, and is but a small part of the total curriculum where it is found at all.

Some further light is thrown on teacher-training offerings in the junior college, and on the extent to which teachers are prepared in these two-year schools by a thesis for the master's degree, presented at the Colorado State Teachers College.[2] In this investigation, an analysis of 101 catalogs of junior colleges located in 24 states revealed 72 with teacher-training courses, and 57 questionnaires returned from junior colleges in seventeen states reported 41 teacher-training departments. (No two-year state teacher-training institutions are included in this study.)

[2] W. A. Mangum, Teacher Training in the Junior College. Master of Arts Thesis, Colorado State Teachers College, Greeley, Colorado, 1928.

TABLE II

Location and Frequency of Twelve Types of Public Junior Colleges, 1927-28

Types of Junior Colleges	Location and Frequency	Total
1	2	3
I. PART OF LOCAL PUBLIC SCHOOL SYSTEM		
1. City School District	Arkansas 2; Colorado; Florida 1; Illinois 1; Iowa 17; Kansas 9; Michigan 6; Minnesota 7; Missouri 6; Nebraska 1; Oklahoma 2; Pennsylvania 1; Texas 15; Washington 1	71
2. High School District	Arizona 1; Arkansas 1; California 16; Illinois 4; Iowa 2; Mississippi 7; Missouri 1	32
3. Union High School District	Washington 1	1
4. County District	Florida 1; Georgia 1; Louisiana 3	5
5. Junior College District	California 14	14
TOTAL		123
II. STATE SUPPORTED JUNIOR COLLEGES*		
1. Vocational		
a) Agricultural schools	Arkansas 5; California 1; Oklahoma 3; Texas 2	11
b) School of forestry	North Dakota 1	1
c) School of mines	Oklahoma 1	1
d) Polytechnic	Oklahoma 1	1
2. School of Science	North Dakota 1	1
3. Military Schools	New Mexico 1; Oklahoma 1	2
4. Branches of State Universities	Idaho 1; Philippines 1; Tennessee 1; Utah 1	4
5. Liberal Arts Colleges	West Virginia 1; Oklahoma 1	2
TOTAL		23
Grand Total		146

*A total of 23 two-year state teachers colleges and state normal schools, as reported by the Commission on Classification and Accrediting, American Association of Teachers Colleges, are not included in this investigation.

In Separate Vocational Colleges

The original investigation shows that out of the 146 public junior colleges listed, at least 23 operated under complete state support. This is shown in Table II.

When one attempts to separate the group of 146 institutions into those with more liberal objectives and those looking toward rather definite life activities, a perfectly definite line of demarcation is hard to establish because a rather large group of the arts colleges are found to be advertising occupational outcomes in terminal curriculums.

However, in this article it is thought to be worth while to choose for separate analysis a number of institutions which so far as can be determined, are representative of a group which no doubt will grow in size rather rapidly, those in which it is frankly said that their total effort is comprised in vocational or preoccupational purposes. Examining Table II, it seemed probable that the best choice for such a separate study would be the first fourteen colleges[3] under section II, the eleven agriculture schools in Arkansas, California, Oklahoma, and Texas, the schools of forestry and mines in North Dakota and Oklahoma, and the Northeastern Oklahoma Junior College, a polytechnic school retaining, so far as could be gathered from its catalog, as the largest portion of its offerings, the courses of its former status as the Miami School of Mines. Course statements from two of these junior colleges were not available. These are the Agricultural and Mechanical College at Magnolia, Arkansas, and the Eastern Oklahoma College at Wilburton, Oklahoma.

The curriculums of twelve of these fourteen vocational junior colleges have been examined in detail, and the following sixteen subject groups found: Agriculture; ancient languages; art; commerce; education; industrial arts; English; home economics; mathematics; modern foreign languages; music; physical education; psychology; public speaking; science; and social studies. Each group has been tabulated in terms of frequency by colleges, average number of semester hours offered per school, and total range in semester hours.

The sixteen tables cannot be reported here in their entirety, but the details for agriculture are given by way of illustration in Table III. It is seen that the findings on the agricultural offerings of these twelve junior colleges are grouped as agriculture, veterinary medicine, and forestry; and that a total of 47 separate courses are listed, seven and five under veterinary medicine and forestry respectively. Note that the courses are given under each general heading in rank order of

TABLE III

The number of Vocational Junior Colleges Offering Courses in Agriculture with the Average Semester Hours and Range of Semester Hours per Institution in Twelve Colleges, 1927-28

Courses	No. of Colleges Making Offering	Average Semester Hrs. per School	Range in Semester Hours	Courses	No. of Colleges Making Offering	Average Semester Hrs. per School	Range in Semester Hours
1	2	3	4	1	2	3	4
I. AGRICULTURE				26. Farm machinery	1	3.0	3
1. Animal husbandry	8	4.2	2 -5	27. Electric wiring and repair	1	3.0	3
2. Prin. of dairying	7	4.8	2 -12	28. Autos and trucks	1	4.0	4
3. Agric. bacteriology	7	4.5	2 -9	29. Machine shop	1	1.5	1.5
4. General gardening	6	3.0	1.3-5	30. Tractors	1	4.0	4
5. Soils	6	4.5	4 -5	31. Judging beef	1	1.0	1
6. Crops	6	3.5	2.6-4	32. Plant propagation	1	3.0	3
7. Poultry raising	6	3.8	2 -5	33. Ornamentals	1	3.0	3
8. Horticulture (general)	5	3.2	2 -5	34. Nut culture	1	3.0	3
9. Farm shop mechanics	5	2.3	1.3-3	35. Fertilizers	1	3.0	3
10. Judging types and market classes	5	2.9	2 -6	II. VETERINARY MEDICINE			
11. Advanced dairying	4	3.9	2 -5.3	1. Veterinary physiology	1	4	2
12. Fruit growing	4	3.2	2.6-4	2. Advanced physiology	1	7	2 -5
13. Graphic methods	3	1.0	1	3 Veterinary anatomy	1	6	6
14. Drainage and terracing	3	2.0	2	4. Advanced anatomy	1	6	6
15. Agronomy	2	4.3	3.6-5	5. Animal diseases	1	4	4
16. Agric. chemistry	2	5.2	5 -5.3	6. Veterinary anatomy direction	1	6	6
17. Rural engineering	2	1.7	1.5-2	7. Veterinary pathology	1	4	4
18. Entomology	2	4.2	3 -5.3	III. FORESTRY			
19. Animal production	2	5.5	2 -9	1. General forestry (lectures)	1	1.3	1.3
20. Meats	2	3.4	2 -4.5	2. Groves and windbreaks	1	2.0	2
21. Breeds of Farm animals	2	2.5	2 -3	3. Dendrology	1	5.3	5.3
22. Vegetable gardening	2	4.5	3 -6	4. Seeding and planting	1	2.0	2
23. Agric. geography	1	1.3	1.3	5. Freehand lettering	1	0.3	0.3
24. Agric. botany	1	8.0	8				
25. Gas engines	1	3.0	3				

TABLE IV

Curricular Offerings of Twelve Vocational Junior Colleges in Six States, 1927-28

Subjects and Subject Groups	Average No. of Semester Hours	No. Making No Offering	Range in Semester Hour	Average Percentage of Total Offering
1	2	3	4	5
1. Agriculture	33.6		6-146	10.7
2. Ancient languages	13.3	10	0- 20	4.2
3. Art	8.5	9	0- 17	2.7
4. Commerce	33.7	8	0- 61.6	10.6
5. Education	23.8	3	0- 55	7.6
6. Engineering and industry	39.4	4	0- 65	12.5
7. English	11.4	0	6- 15	3.6
8. Home economics	27.1	2	0- 56	8.6
9. Mathematics	15.6	0	6- 28	4.9
10. Modern foreign languages	18.2	2	0- 40	5.8
11. Music	23.4	6	0- 40	7.4
12. Physical education	4.7	4	0- 13	1.5
13. Psychology	5.2	6*	0- 7.6	1.6
14. Public speaking	3.7	5	0- 7	1.2
15. Science	39.8		8- 97.5	12.6
16. Social studies	14.4		5- 25	4.5
Total	316.1		86-552	100.0

* Educational psychology is included under education.

[3]Fourteen vocational junior colleges:
1. *Arkansas*:
   a) Magnolia, Magnolia Agricultural and Mechanical College.
   b) Monticello, Monticello Agricultural and Mechanical College.
   c) Jonesboro, Agricultural and Mechanical College.
   d) Pine Bluff, Pine Bluff A. M. and N. College.
   e) Russellville, Arkansas Polytechnic College.
2. *California*:
   a) San Luis Obispo, California Polytechnic School.
3. *Oklahoma*:
   a) Lawton, Cameron State School of Agricultural.
   b) Miami, Northeastern Oklahoma Junior College.
   c) Tishomingo, Murray State School of Agricultural.
   d) Warner, Connor State School of Agricultural.
   e) Wilburton, Eastern Oklahoma College.
4. *Texas*:
   a) Arlington, North Texas Junior Agricultural College.
   b) Stephenville, John Tarleton Agricultural College.
5. *North Dakota*:
   a) Bottineau, State School of Forestry.

TABLE V

Curricular Offerings in Terms of Average Number of Semester Hours in Fifteen Public and Fifteen Private Liberal Arts Junior Colleges and in Eleven Vocational Junior Colleges, 1927-28

Courses	Arts Curriculums			Vocational Curriculums
	Public	Private	Total	
1	2	3	4	5
1. Agriculture		1.2	0.6	33.8
2. Ancient languages	9.2	15.2	14.1	13.3
3. Art	9.5	18.5	14.9	8.5
4. Bible and religion	1.6	8.1	6.1	0.0
5. Commerce	21.2	30.0	23.7	33.7
6. Education	10.1	17.7	14.7	23.9
7. Engineering and industry	10.2	0.0	5.1	39.4
8. English	14.6	17.3	15.9	11.4
9. Extension and night school	1.6	0.0	0.8	0.0
10. Home economics	7.0	15.1	13.7	27.1
11. Mathematics	17.4	13.2	15.3	15.6
12. Modern foreign languages	32.0	36.9	34.4	18.2
13. Music	5.6	25.1	14.2	23.4
14. Philosophy	3.9	6.2	4.8	0.0
15. Physical education	3.5	9.3	4.9	4.7
16. Psychology	5.8	6.2	5.9	5.2
17. Public speaking	5.9	16.3	10.6	3.7
18. Science	32.9	26.3	29.3	39.8
19. Social studies	22.1	26.4	24.2	14.4
Total	214.1	289.0	253.2	316.1

frequency, animal husbandry being offered by eight out of the twelve colleges, principles of dairying and agriculture bacteriology by seven, etc. The veterinary and forestry curriculums seem to be confined to single institutions, the former in the North Texas Junior College at Arlington, and the latter in the School of Forestry at Bottineau, North Dakota. The average number of semester hours found in the catalogs of the twelve vocational junior colleges is given for each course in column 3. This is seen to range among the 47 courses listed from one third of an hour to eight hours, the courses yielding the most credit being, in general, those offered most often. Column 4 reports the range in semester hours for each course, and here again rather a wide conception of values is exhibited (0.3 to 9).

The checking for the sixteen subject groups is summated in Table IV; and column 3 gives another item of information, the frequency of colleges making no offering. The figures in column 3 are significant as showing that but five of these course groups appear in all of the twelve curriculums analyzed, that ancient language and art are not found in ten and nine of them, that the commercial element is not strong, that pure psychology is not thought necessary in two thirds of the colleges, and that music and public speaking are not taught in about half of them.

TABLE VI

Curricular Offerings in Terms of Number of Schools Making no Offering in Nineteen Subjects in Fifteen Public and Fifteen Private Liberal Arts Junior Colleges and in Eleven Vocational Junior Colleges, 1927-28

Courses	Arts Curriculums			Vocational Curriculums
	Public	Private	Total	
1	2	3	4	5
1. Agriculture	15	14	29	
2. Ancient languages	9	2	11	8
3. Art	11	9	20	9
4. Bible and religion	10	4	14	10
5. Commerce	10	13	23	7
6. Education	9	6	15	3
7. Engineering and industry	7	15	22	4
8. English	0	0	0	0
9. Extension and night school	3	15	18	10
10. Home economics	13	5	18	2
11. Mathematics	0	0	0	0
12. Modern foreign languages	0	0	0	2
13. Music	6	8	14	6
14. Philosophy	8	10	18	10
15. Physical education	0	10	10	3
16. Psychology	4	2	6	7
17. Public speaking	4	7	11	4
18. Science	1		1	
19. Social studies				

On the basis of average number of semester hours offered (column 2), the relative value of these sixteen course groups appear with science, engineering, and agriculture at the top of the array, and public speaking, physical education, and psychology at the bottom. In range of emphasis given (column 4), the extreme is in agriculture (6 to 146 hours), while in public speaking it is but 0 to 7. Column 5 gives another measure of relative curriculum emphasis, and shows science and engineering receiving most, agriculture and commerce next, and public speaking, phychology, and physical education the least emphasis of all

TABLE VII

Curricular Offerings in Terms of Range of Semester Hours in All Subjects in Fifteen Public and Fifteen Private Liberal Arts Junior Colleges and in Eleven Vocational Junior Colleges, 1927-28

Courses	Arts Curriculums			Vocational Curriculums
	Public	Private	Total	
1	2	3	4	5
1. Agriculture	0- 0	0-17	0-17	6-146
2. Ancient languages	0-24	0-50	0-50	0- 20
3. Art	0-26	0-32	0-32	0- 17
4. Bible and religion	0- 3	0-30	0-30	0- 0
5. Commerce	0-47	0-41	0-47	0- 62
6. Education	0-27	0-31	0-31	0- 55
7. Engineering and industry	0-37	0- 0	0- 0	0- 85
8. English	5-42	10-64	5-64	6- 15
9. Extension and night school	0-14	0- 0	0-14	0- 0
10. Home economics	0- 8	0-24	0-24	0- 56
11. Mathematics	3-34	4-25	3-34	0- 28
12. Modern foreign languages	10-80	6-72	6-80	0- 40
13. Music	0-12	0-58	0-58	0- 40
14. Philosophy	0- 6	0-12	0-12	0- 0
15. Physical education	0-11	0-27	0-27	0- 13
16. Psychology	0- 9	0-14	0-14	0- 8
17. Public speaking	0-14	0-43	0-43	0- 7
18. Science	0-63	5-44	0-63	0- 98
19. Social studies	6-45	10-64	6-64	5- 25
Total Range	59-376	97-325	59-376	86-562

The trend of purposes is apparent in this group of twelve vocational junior colleges. They all offer science, agriculture, mathematics, the social studies, and English in this rank order as determined by percentage of total offerings. Ten of them offer home economics and the modern foreign languages to the extent of about 9

TABLE VIII

Curricular Offerings in Terms of Average Percentage of Total Offering in All Subjects in Fifteen Public and Fifteen Private Liberal Arts Junior Colleges and in Eleven Vocational Junior Colleges, 1927-28

Courses	Arts Curriculums			Vocational Curriculums
	Public	Private	Total	
1	2	3	4	5
1. Agriculture		0.4	0.2	10.7
2. Ancient languages	4.3	5.3	5.6	4.2
3. Art	4.4	6.4	5.8	2.7
4. Bible and religion	0.7	2.8	2.4	0.0
5. Commerce	9.9	10.4	9.3	10.6
6. Education	4.8	6.2	5.8	7.6
7. Engineering and industry	4.8	0.0	2.4	12.5
8. English	6.8	6.0	6.3	3.6
9. Extension and night school	0.7	0.0	0.3	0.0
10. Home economics	3.4	5.2	5.4	8.6
11. Mathematics	8.1	4.6	6.0	4.9
12. Modern foreign languages	14.9	12.8	13.5	5.8
13. Music	2.6	8.7	5.6	7.4
14. Philosophy	1.8	2.1	1.9	0.0
15. Physical education	1.6	3.2	1.9	1.5
16. Psychology	2.7	2.1	2.3	1.6
17. Public speaking	2.8	5.6	4.2	1.2
18. Science	15.4	9.1	11.5	12.6
19. Social studies	10.3	9.1	9.6	4.5
Total	100.0	100.0	100.0	100.0

per cent and 6 per cent of the total. Nine have educational courses constituting 8 per cent of the entire curriculum. It is understood that this investigation does not include at all that large group of two-year state teacher-training institutions whose objectives are no doubt, found completely in the realm of teaching.

Arts and Vocational Courses

It is significant to compare the curriculum emphases found among these twelve vocational junior colleges with those reported from the arts curriculums of fifteen public and fifteen private junior colleges. These are paralleled by course groups in Tables V to VIII inclusive. Table V deals with average number of semester hours offered, and the differences found in columns 4 and 5 are striking, as well as the similarities. For example, it would seem that the vocational schools could more easily justify a like emphasis on modern language rather than on the ancient classics; and one is surprised to note the relative importance of music, appearing with twice the average number of semester hours in the vocational colleges.

The details of contrasts found in Tables VI, VII, and VIII will not be pointed out. To any one interested, they are easily found. The summation figures on semester hours in Tables V and VII are significant. One would expect the vocational schools to have studied the activities of their graduates and the social situations into which they go upon graduation so that they could arrange curriculum offerings to prepare rather specifically for actual things-to-be-done. But the average number of semester hours represented in the curriculums of these schools is nearly 100 more than in the arts colleges (316.1 and 253.2), and the range in hours offered is much larger (466 and 317). Evidently they are groping about among the complex of possibilities of what they might and can offer hoping to discover eventually by trial and error what will be most acceptable to their clientele, using in the meantime their enrollment numbers as approval and success indices.

Some Methods of Handling Instruction Sheets

J. W. Bollinger, Roosevelt Junior High School, Tulsa, Oklahoma

MORE and more industrial-arts men are recognizing the value of individual instruction sheets, and are using them as an aid to instruction in their shops. Along with the difficult problem of working out the material which is to be embodied in the instruction sheets, comes the problem of the form to give the material and of how to handle the sheets after the material has been assembled.

The instructor's first attempt at using an instruction sheet will in all likelihood take the form of a written or typewritten sheet pinned up on the bulletin board. Of course the instructor finds at once that this method is inefficient. There are too many pupils using the sheet at one time. The net result is friction, loss of time, and lack of understanding of the directions given. Then, too, it is next to impossible to prevent pupils from putting their fingers on the paper, so that in a short time the sheet is so badly thumbed and worn as to make it illegible. The latter difficulty might be overcome by covering the bulletin board with glass. Even if this were done, it soon becomes evident that the bulletin board is far too small to accommodate all the additional sheets that would have to be put up as the work progresses.

The next effort of the instructor is usually the following: He will make a drawing as before, then trace the drawing on a large sheet of tracing cloth, and typewrite his directions on the tracing. Blue prints of this tracing may then be put up at different places in the room, and the tracing saved for the following semester.

Or, better still, sufficient blue prints may be made to supply one to each student. This procedure has its advantages. Each pupil has his own instruction sheet. He is independent. He works as fast as his ability permits. It is particularly fine that he learns to work from blue prints, very much as he would be required to do if he were working in a factory. The fact that the drawing and the instructions are on one sheet is another good point, because pupils ordinarily do not readily page back from the drawing to the instructions, and vice versa. But here again, the procedure has its difficulties. There is the matter of expense; shall the pupil pay for the tracing cloth and the blue-print paper, or shall the school pay for them? Then, what is the pupil to do with the blue print from one class period to another? If he carries it with him he will usually lose it. If he puts it in his locker with his work, provided that he is fortunate enough to have a locker, the sheet becomes badly worn and torn because usually other pieces of material are piled on it. If the instruction sheets are passed out and collected each period, there is too much time lost, and the task places too much responsibility on the instructor. This is especially true after the work had been in operation for some time.

To overcome the objections enumerated in the foregoing, one teacher sold each of his pupils a large craft-paper envelope. The pupil's name and class hour were written on the envelope, and he was required to keep his instruction sheets in the envelope. All the envelopes belonging to one class were kept on a particular shelf, and one boy was appointed whose task it was to pass out and collect them. The blue prints for the different projects were also filed away in envelopes. Each of these envelopes were plainly numbered and labeled. By having an index to the envelopes lying on his desk, the teacher could find what he wanted quite rapidly. As a pupil completed a job, he returned the blue print and received another. At the end of the semester the total expense for blue-print paper and tracing cloth was counted up, and the cost was then prorated among the pupils.

Another instructor in the same school system followed a slightly different plan. He worked out *operation* sheets describing shop processes, and *job* sheets describing the making of projects. Wherever possible, the job sheet referred the student to an operation sheet for any particular step in the making of a project. Blue prints describing operations were made on one size of sheet, and those describing projects were made on another size sheet. Then, for each size of sheet the instructor made a large number of holders or pockets out of light sheet metal. The face sides of the pockets were provided with celluloid covers, so that

the blue prints could be readily seen, but they were at all times protected against dirt and wear. Each operation was designated by a letter of the alphabet, and each project by a number. These numbers and letters were placed in a prominent position on the blue print and on the cover. An index placed on the bulletin board served as a guide to help find the particular blue print wanted. The instructor also kept a bound volume containing copies of all the blue prints on his desk for reference. To store these blue prints, he divided two long shelves, one for each size of pocket, into narrow vertical compartments; each of these compartments was plainly numbered or lettered to correspond to the number or letter of the pocket it was to contain. Each pupil secured his own sheets from the shelves, and was responsible for returning them at the close of the period. After the pupils became acquainted with the system, it worked very smoothly.

Of course, both of the schemes outlined in the foregoing require a large amount of the instructor's time outside of class hours. In both instances, some of the burden may be removed by having the school stenographer cut the stencils and turn out the mimeographed sheets for the lessons.

In one large school system, the supervisor has regular conferences with all instructors engaged in the same line of work. Each instructor prepares a job sheet on one of a list of projects which he thinks would be usable in his shop. At the conference these sheets are discussed and revised. When a suitable form has been agreed upon, enough copies are mimeographed or blue-printed to supply all the pupils of all the teachers for that semester. The mimeographing is done by the school stenographer; the tracing is prorated among the instructors, and the blue printing is done in the mechanical-drawing classes. The finished sheets are punched to fit into a loose-leaf folder, which each pupil is required to buy. At the end of the semester, each pupil possesses a complete set of job sheets on all the jobs he has undertaken, and pays for the number of blue prints he has used. The information sheets and sets of questions that are used throughout the year are prepared in the same way.

The difficulty with this method is that no two shop teachers teach in exactly the same way, nor are any two shop situations ever exactly the same for any great length of time. The danger therefore exists that the supervisor's wishes might dominate the teaching staff, thus tending to reduce the teacher's individuality and lessen his power as a teacher.

Another large school system, after preparing its instruction sheets in much the same manner described herein, has a whole "course" of them bound into book form, and then sells a complete booklet to each pupil.

An increasing number of schools are purchasing textbooks in which the material appears in job-sheet form, and are either supplying them to the shops free of cost in the same way as the academic texts are furnished, or are requiring each pupil to purchase a book for his own use. Recently, printed instruction sheets, ready for use in class, have been put on the market, and are finding widespread acceptance in shop classes.

Another excellent method of handling instruction sheets is described by Professor R. W. Selvidge on pages 91 to 97 of his book Individual Instruction Sheets (Manual Arts Press). The book, by the way, is an excellent one, and should commend itself to every instructor who is interested in writing instruction sheets. Professor Selvidge would prepare a complete set of operation sheets, and would then require each pupil with the help of the instructor to plan his own method of procedure for whatever project he wishes to make. To quote:

"There is no doubt that pupils may be trained readily to plan their jobs. If with the aid of the (list of operations) analysis sheet, the student cannot make a pretty fair plan of his job, we may be sure that the job is too difficult for him and he should be assigned a simpler one. In the beginning, in order that he may become familiar with the process of planning, the student should be required to plan three or four simple jobs. This may be carried on as classwork, and the plans compared. . . .The instructor should give all necessary information and directions and give a demonstration of any new process involved. . . . The teacher should never neglect the analysis and the planning of the job. It is a matter of thought and reasoning and represents the highest type of mental effort. The ability to plan is the thing that marks the distinction between the capable, self-reliant, high-grade mechanic, and the low-grade journeyman who can do only the things he is told to do. . . . The teacher who arouses the desire and develops the ability of the pupil to analyze and plan his problems has performed for him an inestimable service."

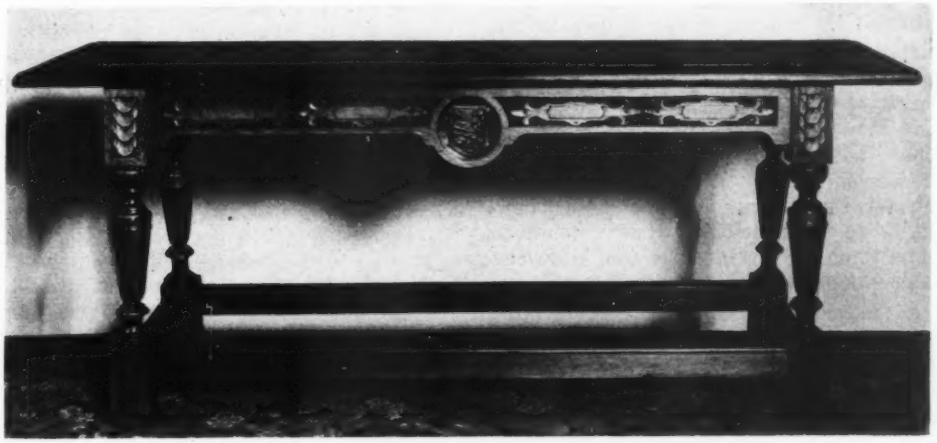


TABLE DESIGNED BY MR. REINHOLD FORKEL, DIRECTOR OF ART AND DESIGN, AT THE SCHOOL OF INDUSTRIAL ART, TRENTON, NEW JERSEY

INDUSTRIAL-ARTS MAGAZINE

EDITORS

E. J. Lake *J. J. Metz* *S. J. Vaughn*

AN EMBARRASSING MOMENT

Teachers as a whole take their work very seriously. They try to make it comprehensive too, so that it may truly function in the lives of their students. Nevertheless, it is very difficult to know when a given subject has been fully covered.

Recently a prominent manufacturer was visiting a school in which auto mechanics was one of the trade courses. He was favorably impressed by the work that was being done. This impression was obtained just as soon as he entered the class, because he saw all of the students busily engaged on bona fide auto-mechanics jobs. They seemed to know what they were doing, too. His first impression was still further strengthened by the fact that the instructor, suitably clothed, was also busily engaged checking up the work that the students were doing. Then he was introduced to the instructor, and found him to be a man who had practical experience, was affable, and yet not as voluble as most auto mechanics seemed to think they must be.

After looking around for a little while, the manufacturer happened to see one little boy busily engaged tightening the nut on a bolt. He watched him for a little while and then asked, "What is the name of the tool that you are using?"

"Why, that's a wrench," replied the lad.

"And who made that wrench?"

The boy looked nonplussed for a moment. Then glancing at the wrench itself, his eyes brightened and he promptly replied, "Why, that was made by S.A.E."

The manufacturer, of course, was wondering whether the boys were given some idea of where the tools which they use come from. He was interested in knowing whether the students in this particular shop knew about the superiority of his tools over those made by other manufacturers; that is why he asked the question.

Whether or not the teacher thinks it necessary to apprise his students of the source from whence their tools come is not of such great moment. There is no question though that it adds to the full appreciation of a trade to know what tools are the best to buy. Of course, no two instructors may fully agree on the best kind of wrench to procure for the auto shop, but be that as it may, the students ought to at least know that the S.A.E. on an automobile wrench stands for a very definite thing. It is a bit of related knowledge with which they ought to be fully conversant.

No doubt, the instructor in that class has since impressed all of his students with the fact that S.A.E. is not a trade name nor a manufacturer's mark. The color that mounted to his face as he stood by while the boy answered, gave ample assurance that at least one point would be taught to that class which would remain with them for many a day.

SAFETY

By the time this issue of the INDUSTRIAL-ARTS MAGAZINE reaches its readers, the eighteenth annual Safety Congress in Chicago will be a thing of the past.

Of course, every teacher is interested in safety. Shop teachers especially ought to be doubly interested in the subject. If the attempts of the National Safety Council are to bear the full fruit of which they are capable, safety instruction must commence in the school.

In the past decade the safety movement has gained greater and greater impetus. In spite of all that has been accomplished, however, there were 24,000 fatal industrial accidents, and about the same number of fatal home accidents in 1928. Besides these, there were 27,500 motor-vehicle fatalities and 20,500 other public fatalities. This means a grand total of about 96,000 deaths in this country in one year, many of which could have been avoided. The subject of safety, therefore, is of great importance.

In many industrial shops the safety committee is quite a busy group of workers. Some school shops have adopted the same idea and have school-shop safety committees, the members of which make inspections, recommendations, and reports just as they do in industry. Safety contests, too, are held in some school shops and prizes are awarded to the winners on the occasion of the commencement exercises, or some similar school function. These practices ought to be taken up by all schools.

The shop teacher ought to bear in mind that much of the value of his safety teaching depends upon the importance which he himself places on the subject. The practice of not allowing any student to operate a given machine unless he has had a personal demonstration by the instructor is a very good one to follow. Safety rules ought to be compiled for every machine, and be posted near the machine. A large sign which warns the student not to use the machinery until personally instructed by the teacher, should also be prominently displayed in the shop. Probably a very good method is to have the instructor give a personal demonstration of how to use a machine, emphasizing the various don'ts that are to be observed. This demonstration may be given to an individual or to a small group. Then an examination of the objective test type ought to be given to each one in the group in which special emphasis is placed on the dangerous practices which are to be avoided when operating the given machine. This test should further contain a statement which the student is required to sign, showing that he has witnessed the teacher's demonstration and that the teacher has emphasized the dangers covered in the test. This signed statement, besides the fact that it may be of great assistance in case the student should receive injuries on any piece of machinery, impresses the student with the gravity of the situation, and in this way will do much to cut down school-shop accidents.

—⋄—

RULES FOR SUCCESSFUL WORK

The following rules for successful work are attributed to Edward A. Filene, a Boston merchant. They were taken out of the June and July issues of The Vo-Ag Pilot, a little magazine issued by the State

Department of Education, Charleston, West Virginia. These rules contain so much of interest to every teacher that they are reproduced here.

First, *make your plan in writing*. This forces you to be clear about your purpose. If you merely mull it over in your mind, all sorts of loopholes in your logic will escape you. Most of us do not realize how foggy our ideas are, until we try to write them down in clear and simple sentences.

Second, *compare it with the methods of the most successful men*. The slavish imitation of other men's plans is rarely wise, but it is always wise to check your own plan against plans that other men have followed successfully when they faced similar problems.

Third, *have it criticized in advance by those it will affect*. Those affected by your plan will inevitably criticize it after you put it into operation. They may find flaws in it. If you can get them to find the flaws before you begin work you may save yourself many mistakes. And men who have been advised with about your plan are more likely to be friendly to its operation.

Fourth, *put it into operation*. Otherwise it remains merely a daydream.

Fifth, *see that it keeps itself in operation until revoked*. Until your plan keeps in operation automatically you have not really organized it.

Sixth, *keep the plan open to revision but do not allow it to be changed except after the most careful reasoning*. You must not keep digging up your beans to see if they are growing. Be open-minded about your plan, but remember that a mind can be so open that it is drafty. The best minds have swinging doors rather than open doors. They open for a draft of fresh information in order to close on a decision, to be gladly opened again when the decision needs to be revised.

—✧—

MAKING THE STUDENT THINK

Frequently we hear instructors say that their main objective is to make their students think. This statement is quite general and sounds very impressive. It is heard almost as often as the other shop-worn phrase: "I don't do things for my students. They must learn to help themselves." This last statement is equally impressive. The only question is, What does the student gain from either of these teaching methods? Is his gain commensurate with the time which is expended by him, in doing this or that in order to discover, if possible, the proper methods of accomplishing a given task? Making the student *think* and getting no farther than making him wonder what it's all about, is not helping him very much. The word "think" as used here, according to Webster, means "to exercise the faculties of judgment, conception, inference, to bring before the mind as something that is remembered or apprehended, to reflect, ponder, medidate."

Before a student can make a judgment in a certain matter, he must be able to make comparisons and discriminations; that is, he must have knowledge of the values and relationships of things. This presupposes some knowledge of the question in hand or knowledge of kindred subjects. Frequently, however, the subject matter is partially or entirely new to the student, and he has not sufficient grounds for arriving at judgments.

If the teacher really wants his student to think, he has at hand various methods of assisting this thinking process. Frequently, however, those who so proudly proclaim that they make their students think, use this as an excuse for sitting at their desks while their students are casting about, trying to arrive at some result which they, the students, think may be acceptable to the teacher. This is guessing, not thinking. To make the student really think, is quite a strenuous job which leaves little time for the teacher to spend at his desk. As a matter of fact, a teacher who makes his students think, is a very busy person, for he must resourcefully supply the motive for the boy to think things out for himself.

There was a time when the Socratic method of questioning was much lauded. This method, no doubt, is very good, but it requires a great deal of time and effort. Then too, it presupposes that the teacher is equipped with unlimited ingenuity in the way of devising questions. It is not infrequently referred to as the pumping method. Nevertheless, Socrates really made his students think, but it was he who furnished the guiding effort which enabled them to arrive at the correct conclusions.

While, in this age of many subjects and limited time for teaching, the Socratic method would be found far too slow, yet it should not be entirely discarded, because it is a valuable method when so used, and the results produced are really commensurate with the time that is allotted to the individual subject.

Making the student think is a laudable ambition. It must be remembered, however, that there is no single method that can be depended upon to arrive at this result. Instead, a number of methods must be combined, and each must be used with telling force. The thing that must be kept clearly in mind, however, is that the teacher cannot sit idly at his desk if he wants to succeed in making his students think. To simply use a very general phrase in answering the student's questions and then say "Now you think that out for yourself," may be advisable in some cases. In most cases, however, it will be found that the student wastes entirely too much time in order to arrive at the proper conclusions. The aim should always be to teach the student *how* to think, but the instructor who has the idea that he is teaching this to his students while he spends the greater part of his time sitting at his desk, may know from the outset that he is not succeeding.

—✧—

VOCATIONAL EDUCATION

Everyone must be a contributor to education. Unless a person is a drag on a community, he must be an actual help. Vocational education is not narrow, it is intensely practical.—*Lewis Gustafson.*

—✧—

THE BOOK BEAUTIFUL

There is no other product of the art crafts which inspires such intimate delights as a finely printed book, but the book beautiful can never be thoroughly appreciated if the very subtle characteristics which combine to make the types beautiful, are not recognized and understood.—*Henry Lewis Bullen.*

The Industrial Unit in the New Senior High School, Fort Smith, Arkansas

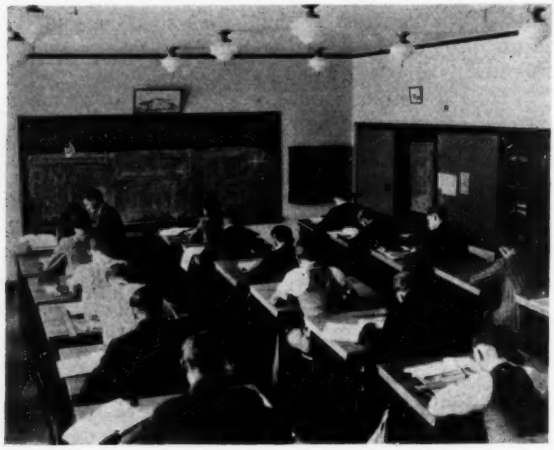
A. E. Smith, Director, Industrial-Arts and Vocational Education, Fort Smith, Arkansas

THE school board made a determined effort, while planning and building the new high school in Fort Smith, to meet the needs of the city by equipping the shops adequately so that students may be prepared who are well fitted for entry into the occupations found in the city.

Printing, woodworking, and auto mechanics are especially emphasized among the industries in Fort Smith. For this reason, the shops for teaching these three trades were carefully planned so that both arrangement and equipment are as practical as possible.

The shops are placed in a unit which is separated from the building by a space 40 feet wide. This is a very satisfactory arrangement, as the noises of the shops are thus shut out of other parts of the building. There is another advantage in this arrangement because the Smith-Hughes classes are in that way isolated from the other parts of the building, hence are less interfered with by the program and work of other classes.

PRINTSHOP, SENIOR HIGH SCHOOL, FORT SMITH, ARKANSAS

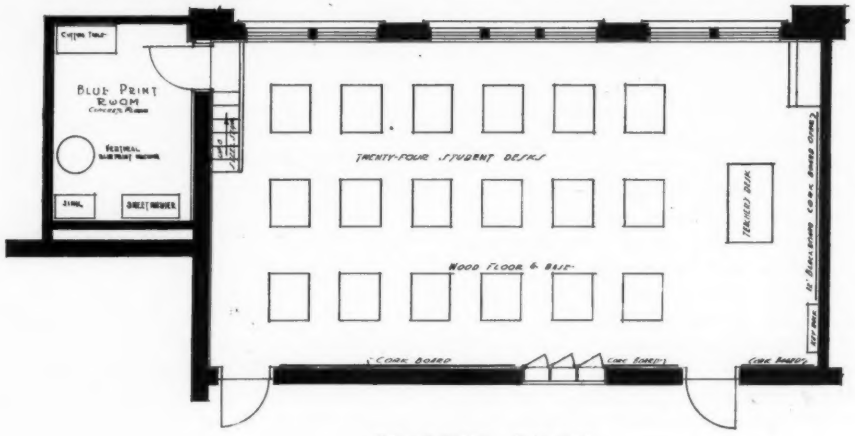


DRAFTING ROOM, NEW SENIOR HIGH SCHOOL, FORT SMITH, ARKANSAS

The woodworking shop and the printing shop were started on the Smith-Hughes basis soon after occupancy of the new building, and the trade classes in auto mechanics and architectural drafting will be ready to begin their work at the opening of school in September, 1929.

A still further advantage accruing from the fact that the shops are located in a separate unit, is the saving of light and heat which is brought about by opening only the shop section to the evening classes. The drafting room is not a part of the shop unit, however, although it is just across the hall from the director's office, thus making it very convenient in relation to the shops.

The printing shop is equipped with 2 platen presses, 1 cylinder press, 2 linotypes, 1 paper cutter, 10 Barnhart school racks, 1 dump table, 2 imposing stones, 1 chase rack, 2 furniture cabinets, 1 large paper cabinet, 1 work table, 1 roller cabinet for cylinder press, 1 roller cabinet each for the two sizes of the



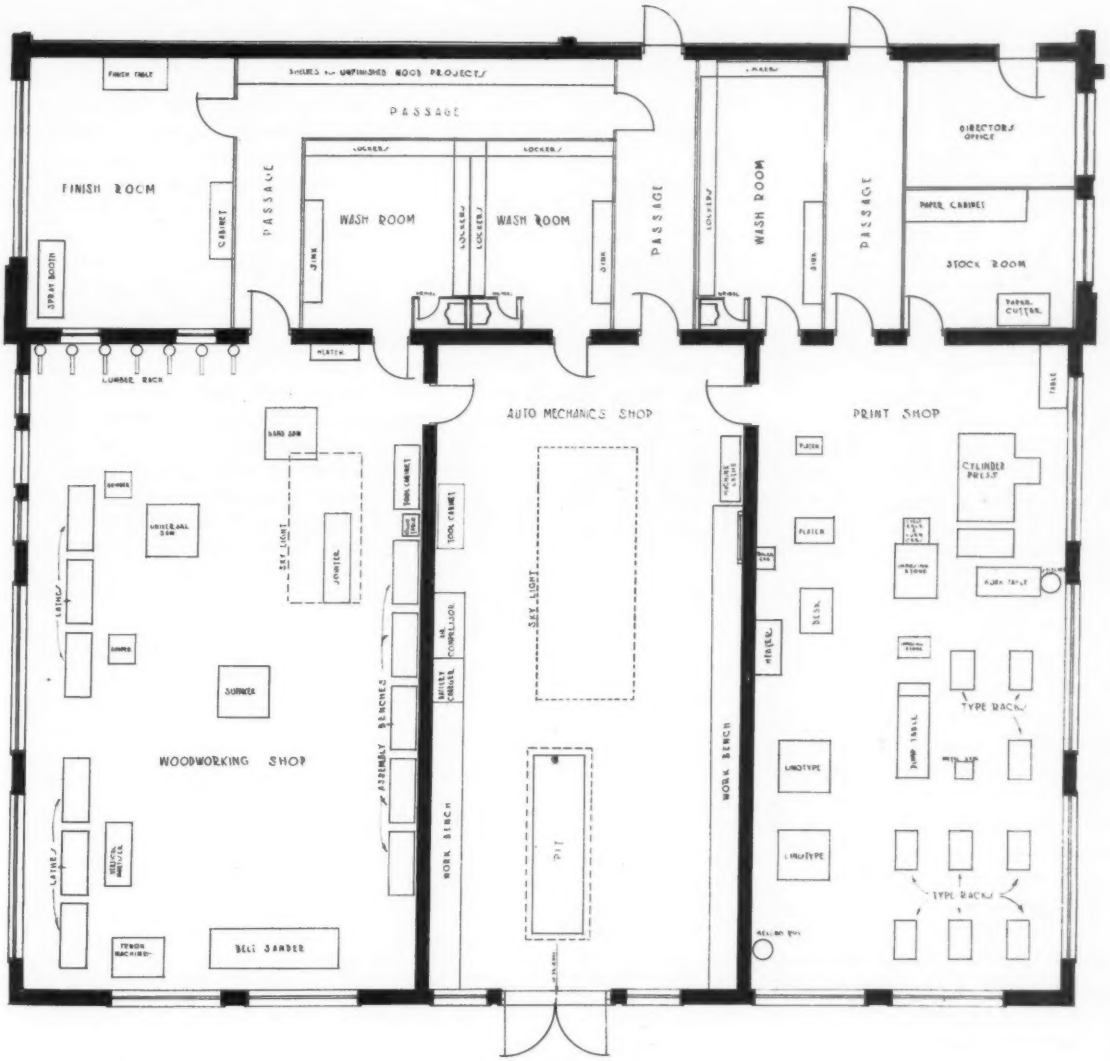
DRAFTING ROOM
SENIOR HIGH SCHOOL
FT. SMITH ARKANSAS

platen presses, 1 metal saw, 1 melting pot, and 1 stereotype caster which is provided to take care of the linotype work. Besides this, there is as complete an outlay of type as can be found in most shops provided with the machines and equipment mentioned in the foregoing. The school printing shop does all of the printing for the school system. It also prints a school paper every two weeks, and a senior class annual twice per year. Some of the students from this school have already taken their places in the trade, and are proving satisfactory.

Plenty of light is provided by windows that run the full height of the wall, the ceiling being 15 feet in each of the three shops. A washroom is provided in the printing shop, so that the student rarely has to leave the shop during class hours.

The auto shop does not have as great an outlet for its students as the printing or woodworking, but Fort Smith does have the standard number of garages, and also a wholesale auto supply company.

AUTO SHOP, NEW SENIOR HIGH SCHOOL, FORT SMITH, ARKANSAS



SHOP UNIT
NEW SENIOR HIGH SCHOOL
FORT SMITH ARK.

WOODWORKING SHOP, NEW SENIOR HIGH SCHOOL, FORT SMITH, ARKANSAS

The equipment provided in the auto shop is as follows: Machine lathe, air compressor, battery charger, engine hoist, 1-ton press, drill, vises, workbenches, pit, and two tool cabinets with all the kinds of tools necessary. Plenty of light is provided in the auto shop, although it is an inside shop, by a large skylight. Double doors are provided for moving the cars in and out, as they are worked on, with a concrete driveway to the street. Separate passages, as shown in the plans, going from each shop have been provided, so that students from one shop do not have to pass through any other shop.

The auto shop also is equipped with its separate washroom. This is quite an advantage when the students from the various shops are washing up at the end of the class period.

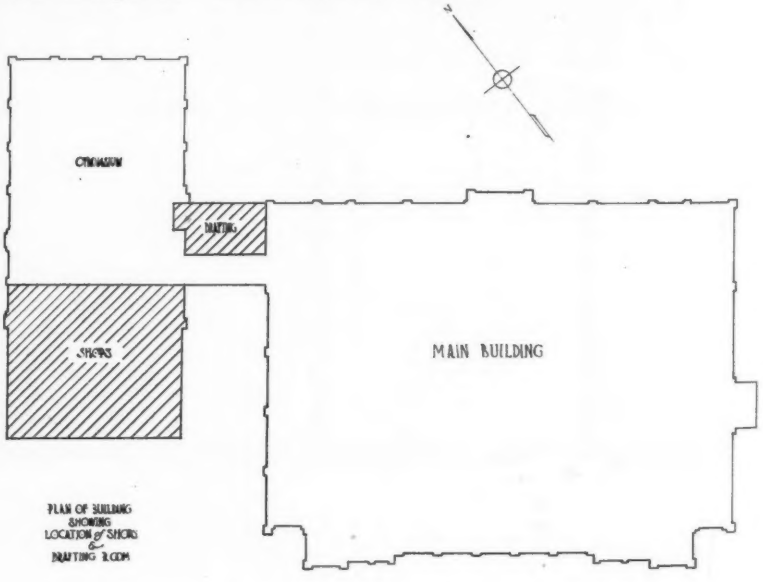
Four-foot doors are provided which open from the printing and woodworking shop into the auto shop, so that heavy freight, such as paper, machines, and equipment and supplies can be moved through the double doors of the auto shop to either of the shops mentioned.

The woodworking shop has a greater outlet than either of the other shops for its student product, because Fort Smith is a furniture manufacturing center. Fort Smith manufacturers probably produce more furniture than any other city in the country, with the exception of Grand Rapids. It embraces 15 large furniture factories which employ about 5,000 men.

The woodworking shop is provided with every standard process machine that is required to mill a piece of lumber, so that a student may learn all the fundamental processes used in the machine manufacturing of furniture. All of the machinery used in the shop is thoroughly guarded to emphasize the safety idea.

Because lumber may be easily, quickly, and cheaply obtained from the lumber yards at Fort Smith, the school needs no special lumber room. A lumber rack, made of pipe running to the 15-foot ceiling and having projections of small pipes about every 3 feet, has been found large enough to store the lumber required to take care of the shop for two weeks.

The machines and equipment located in the woodworking shop are as follows: 30-in. band saw, 12-in. jointer, Universal saw, grinder, 6 lathes, shaper, 24-in. surfacer, vertical mortiser, tenon machine, belt sander, tool cabinet, with all of the hand tools needed for a machine room, electric glue pot, 5 Sheldon assembly benches, and all the hand screws, and iron bar clamps that are necessary for a shop of this size. It will be noticed also that there is a skylight over the jointer which provides ample light for the corner of the room farthest from the windows.



PLAN OF BUILDING SHOWING LOCATION OF SHOPS & DRAFTING ROOM

Tinkering With Tinkers

D. C. Marshall, Manhattan Junior High School, Manhattan, Kansas

THE past few years have seen a great development of organizations to direct the proper use of the boy's spare time. There are bands, orchestras, athletic contests, Hy Y camps and Boy Scout troops, but there is still another class of boys that need the attention of the school and that is those who like to tinker. Many of them do not care for athletics and musical organizations, but prefer to read magazines about mechanical subjects, and try out the things that they have read, or work on ideas of their own origination. It is that class of boys that we have endeavored to reach with an organization in the Manhattan Junior High School.

About two years ago we began an experiment along this line, and the success of the work in such things as increased interest in shopwork, better class spirit, and cooperation in the care and upkeep of shop equipment has been worth all that it has cost in time spent, to say nothing of the value that the boys have received from it.

Manhattan is a college town with very few industrial plants, and there is practically no drift from school into industry. Because of this condition the shopwork cannot be organized as it would in an industrial center but must appeal to those students who like to make things because of a natural interest in such work rather than as a preparation for employment in an industrial plant.

We started this work by inviting all boys who were enrolled in shop classes and who had a workshop at home, to meet after school for the purpose of forming a home workshop club. There were about fifteen who met the first time. After a brief discussion of plans and aims of the club, two evenings each week were set aside for the meetings. Each student is allowed to select his own line of work for this club, and he carries it on independently of his work in class unless he can work the two together without confusion. A club is no good without a name, but there was some hesitation among the boys in selecting one until it was jokingly called the "Woodpecker Club" by one of the boys. This name caught the popular fancy and was adopted.

After the first few months' trial including a summer vacation in which the work was carried on, it became necessary to make a few changes in the organization and the rules governing it. Some boys joined for the sake of joining something rather than because they were interested in a home shop. Their attendance was not good and their behavior did not add to the success of the work. These boys gradually dropped out and to avoid having others of a similar type come in, the boys drew up the following rules:

1. A member must have a home shop with at least the following tools: saw; plane; hammer; bit brace; a few auger bits; a bench; and a vise.
2. They must attend the meetings of the club.
3. They must stay at least one-half hour and work.
4. Absence without a good excuse drops a member from the roll.
5. Members must be voted in by a majority of those in the club.

THE MANHATTAN TINKERS AT WORK

The adoption of these rules succeeded in keeping out all except those who really desired to work. Boys of undesirable character are excluded by the majority vote on membership so that the personnel or the organization is very fine. The aims of the club are to help the boy fit up his own shop by the addition of tools and the making of shop equipment, and also to give him aid in selecting material and planning jobs to be carried on at home. The work is carried on throughout the year so that interest does not have to be revived at the beginning of the new school year.

The activities of these boys cover a wide range since they are working on the things they are most interested in. A good many of them are engaged in building machines for their home shops, such as lathes, bench saws, jig saws, and similar machines. Some of the machines are made from old sewing machines, old auto parts, or regular patterns are made and taken to the foundry for castings for the machines. Some of the boys work with radio, storage batteries, motors, and electrical equipment of all kinds, while others have home chemistry sets and do experimental work of that type along with their woodworking activities. At the annual school exhibit, a model home shop was erected and equipped with machines and tools from the home shops. A group of boys worked in this shop every evening and it proved to be one of the most entertaining and instructive parts of the whole exhibit.

The home shops are of all kinds and sizes from small basement rooms with scanty equipment to a big room with bench saw, jointer, grinder, and other tools. The basement is the most popular place for the shop as it is cool in summer and warm in winter and the question of heat in winter is not a problem. The parents of the boys are heartily in favor of the work, and their only complaint is that it is often hard to get Johnny out of the basement long enough to eat.

Education does three things: It creates wants and desires; it enables the possessor to render service, and the consumer to become a producer; it makes a higher wage possible.—*J. V. Hamilton.*

PLATE NO. 3.

· WOODEN · TOYS ·

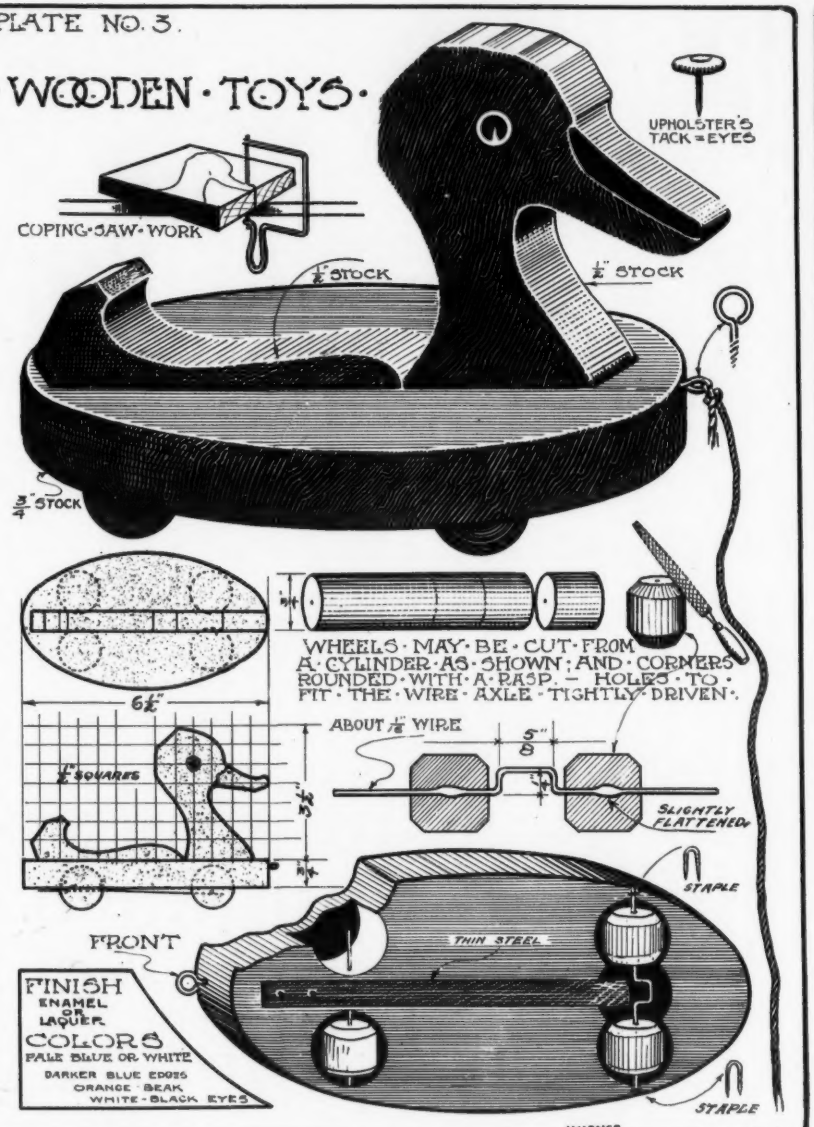
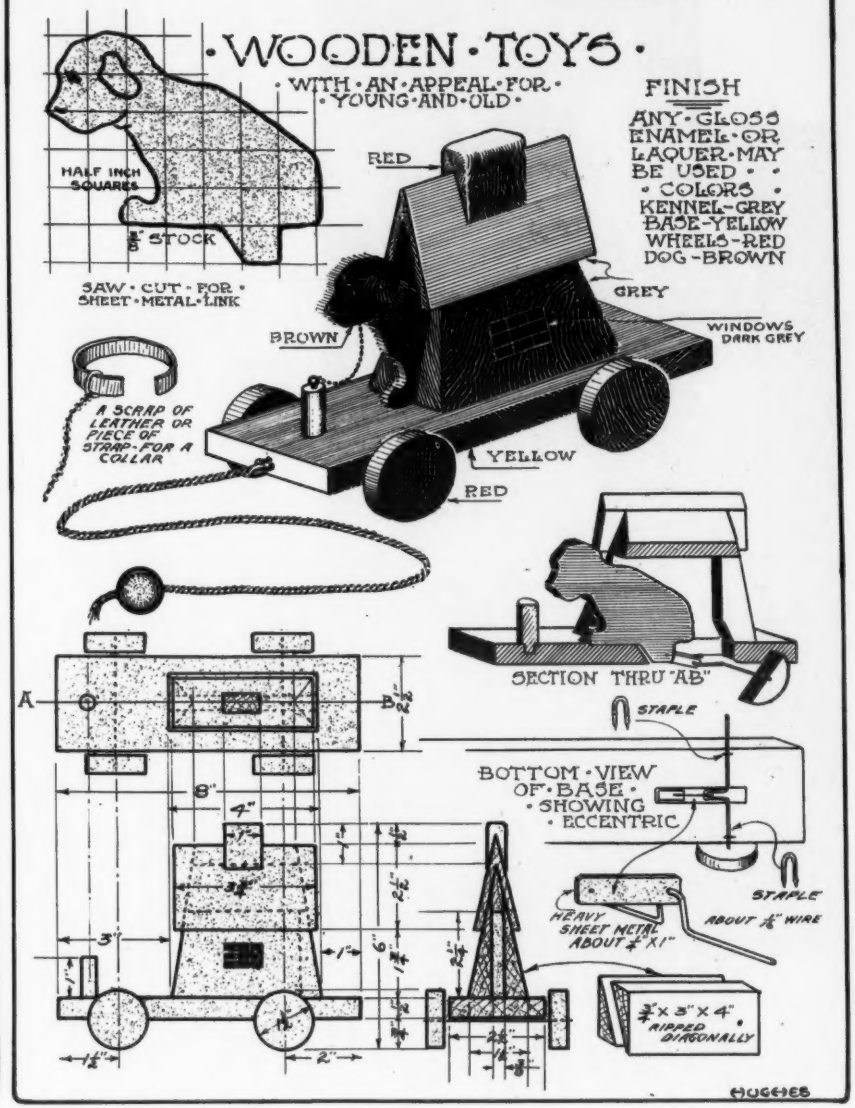


PLATE NO. 4

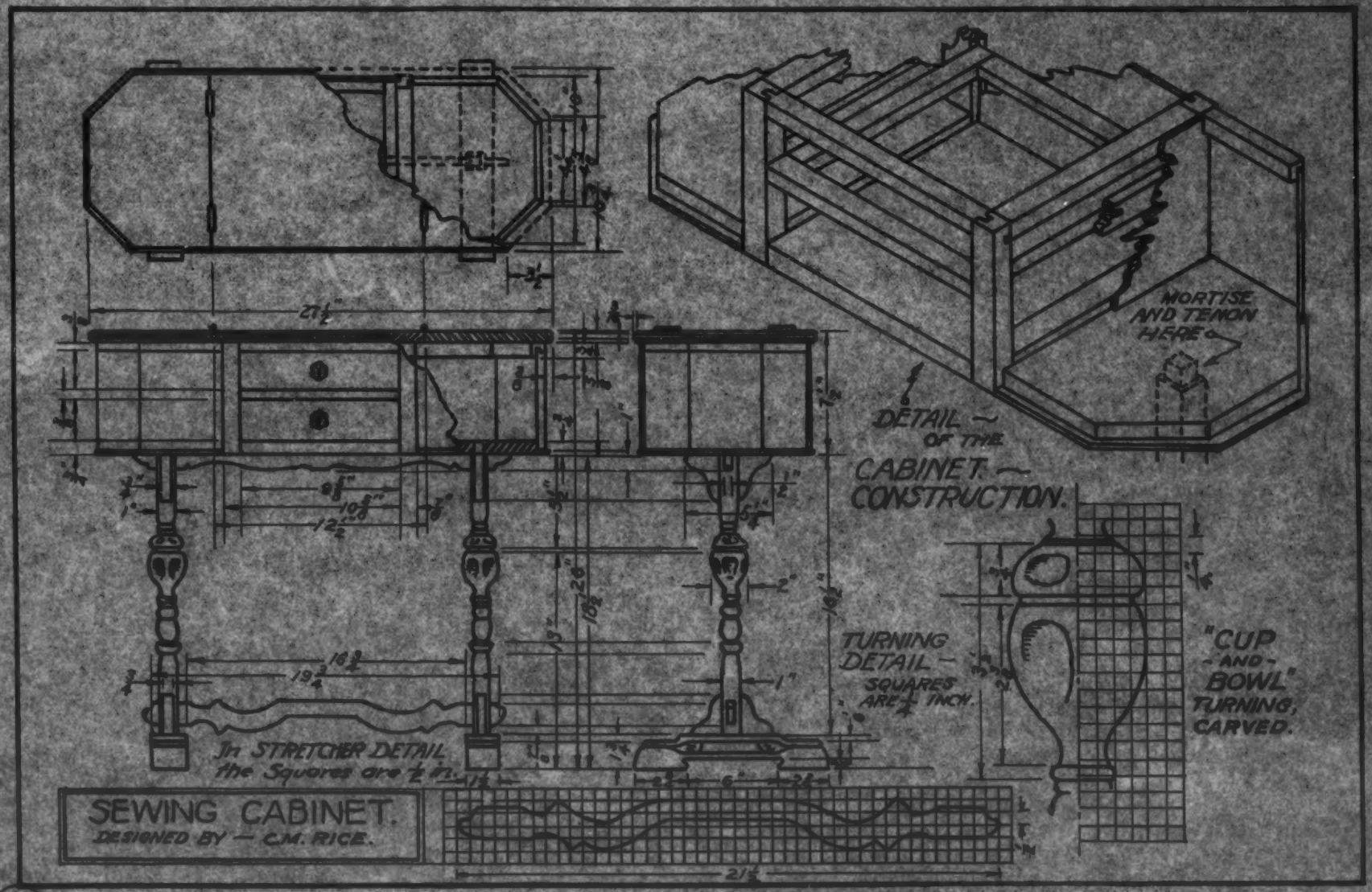
· WOODEN · TOYS ·

· WITH · AN · APPEAL · FOR · · YOUNG · AND · OLD ·



TRACING SUPPLEMENT No. 153,
THE INDUSTRIAL-ARTS MAGAZINE,
NOVEMBER, 1929

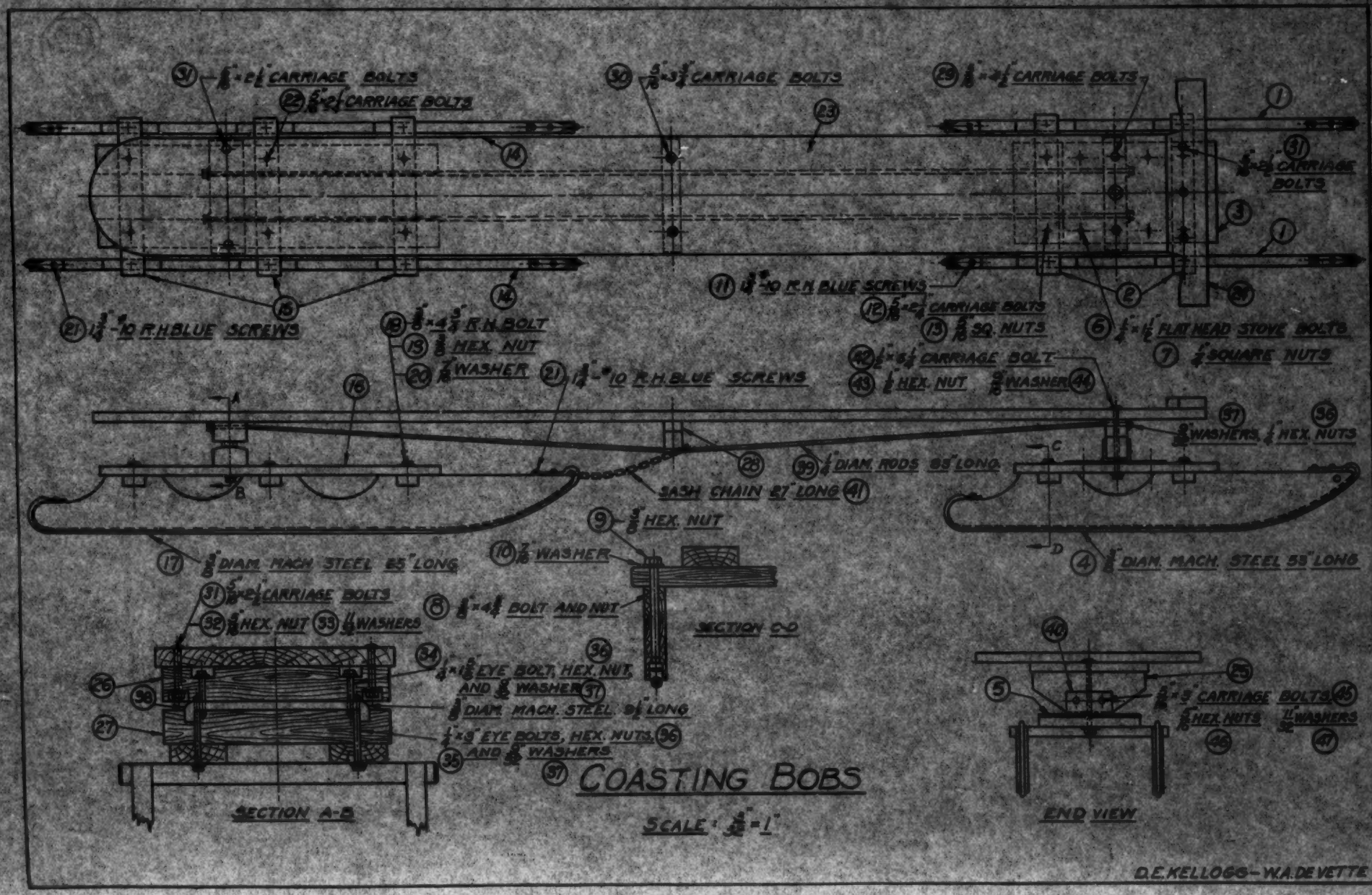
To be blueprinted for School Shop Use Only
© 1929, The Bruce Publishing Co.


MORTISE AND TENON HERE
DETAIL — OF THE CABINET. — CONSTRUCTION.
TURNING DETAIL — SQUARES ARE ¼ INCH.
"CUP - AND - BOWL" TURNING, CARVED.
In STRETCHER DETAIL the Squares are ½ in.
SEWING CABINET.
DESIGNED BY — C.M. RICE.

Designed by C. M. Rice, Everett, Washington

For Directions See Page 425, Industrial-Arts Magazine, November, 1929.

To be blueprinted for School Shop Use Only
© 1939, The Bruce Publishing Co.



COASTING BOBS

SCALE: 3/4" = 1"

D.E. KELLOGG—W.A. DE VETTE

Designed by D. E. Kellogg and W. A. De Vette, Erie, Pennsylvania

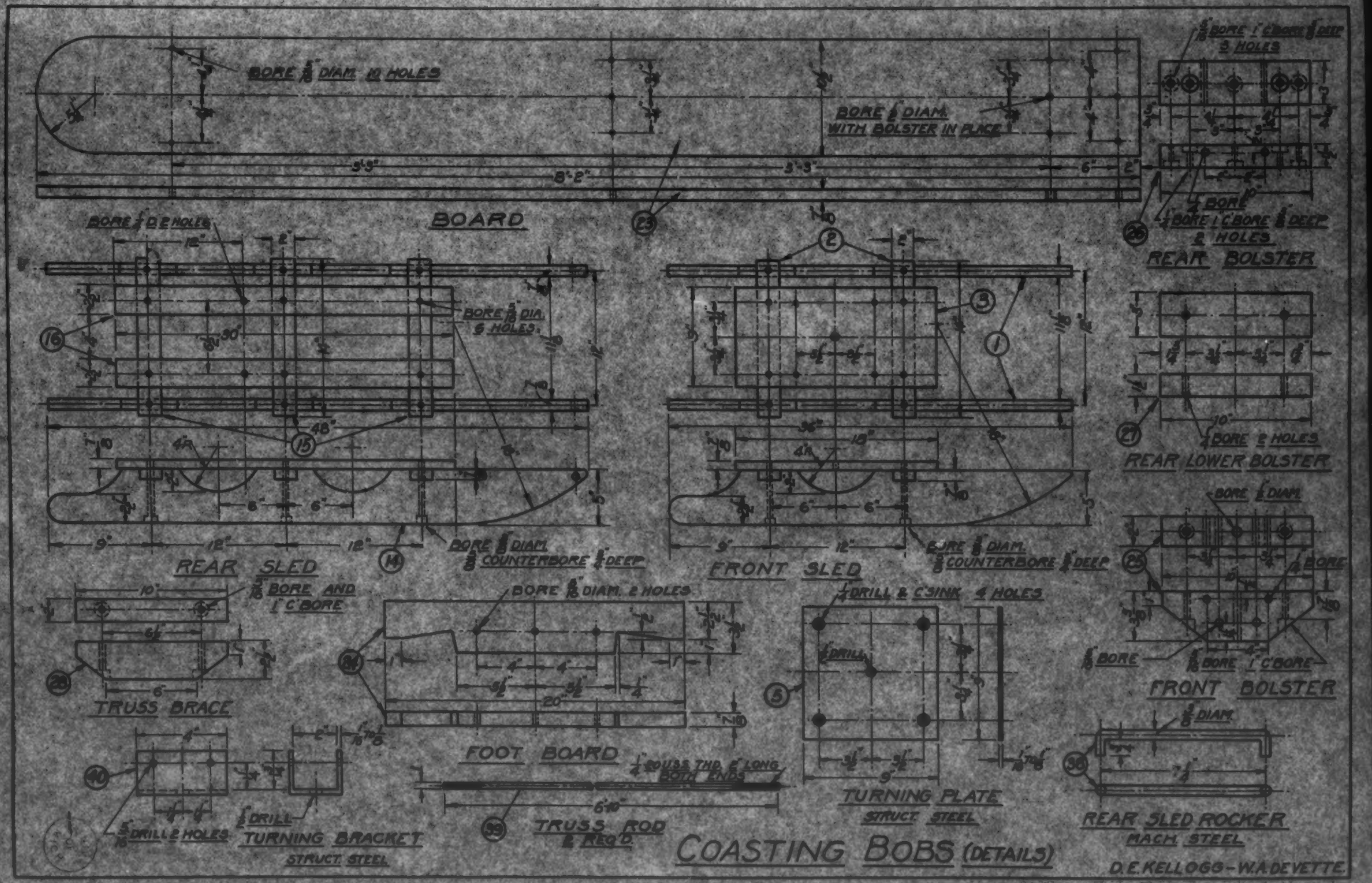
For Description See Page 431, Industrial-Arts Magazine, November, 1939.

TRACING SUPPLEMENT No. 187
THE INDUSTRIAL-ARTS MAGAZINE,
NOVEMBER, 1939

To be blueprinted for School Shop Use Only
© 1939, The Bruce Publishing Co.

TRACING SUPPLEMENT No. 107
THE INDUSTRIAL-ARTS MAGAZINE,
NOVEMBER, 1939

To be blueprinted for School Shop Use Only
© 1939, The Bruce Publishing Co.



Designed by D. E. Kellogg and W. A. De Vette, Erie, Pennsylvania.

For Description See Page 411, Industrial-Arts Magazine, November, 1939.

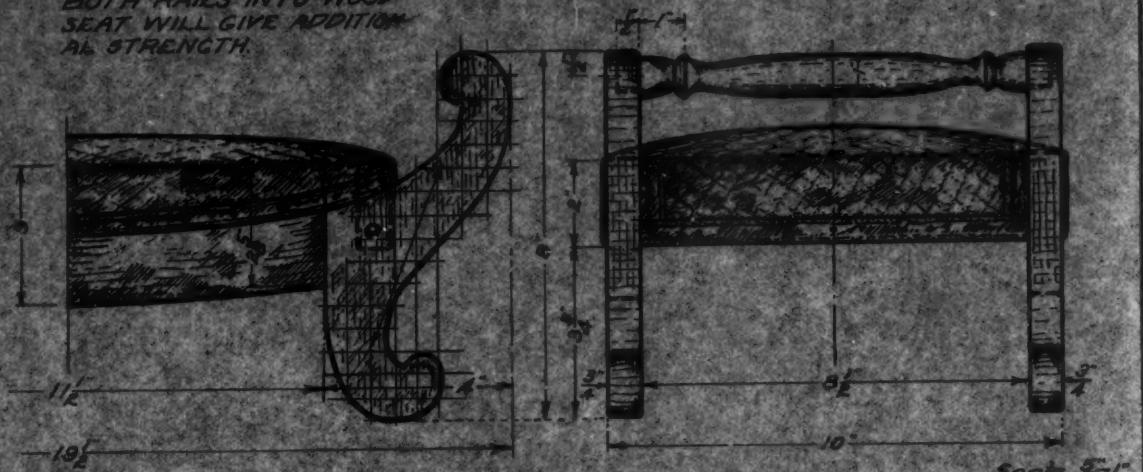
TRACING SUPPLEMENT No. 158
THE INDUSTRIAL-ARTS MAGAZINE
NOVEMBER, 1929

To be Reprinted for School Shop Use Only
© 1929, The Bruce Publishing Co.

ADV. WOODWORK CLIFFORD B. SMITH	FOOT-STOOL	PROJECT INSTRUCTION SHEET A-100

DOWEL JOINTS TO BE USED THRUOUT. FLAT HEAD SCREWS THRU BOTH RAILS INTO WOOD SEAT WILL GIVE ADDITIONAL STRENGTH.

THE ARROW LINE, SHOWN ON THE LEG IN THE FRONT VIEW, SHOWS THE DIRECTION THAT THE GRAIN OF THE WOOD SHOULD TAKE.



THE PROJECT- The footstool may be upholstered in tapestry, leather or imitation leather.

Refer to the following Unit Instruction Sheets:- W-1, The Squaring-Up Process; W-100, Wood Turning; W-20, Curved Edges; W-112, Dowel Joint; W-8, Wood Screws; WT-37, Sandpaper; F-5, Stains; F-1, Shellac; W-40, Upholstering.

MATERIALS- 7/8" red gum, maple or white wood, 1½ x 1½ stock, ⅜" doweling, 1¼"-10 F.H. screws, hot glue, upholstering material, moss, tacks, tape, stain, shellac.

TOOLS- Cross-cut hand saw, circular saw, jack plane, try square, marking gage, drawknife, spokeshave, band saw, 1" chisel, ¾" inside bevel gouge, ⅜" and ¼" auger bits, brace, auger bit gage, doweling jig, knife, "1 and "00 paper, drills and hand drill, countersink, screwdriver, bar clamps, claw hammer, lathe and lathe tools.

DIRECTIONS- 1- Print the bill of material on your working drawing.

-A-

2- Cut out the rough stock for the different items in the bill of material. In the rough, these pieces should be about ¼" longer and ⅛" wider than the finished sizes. Layout with pencil, rule and square on the board. Select a board that will saw with little or no waste. At -A- the boy is using a crosscut saw. Note how he supports the wood. The instructor will rip the pieces to width on the circular saw.

3- Square-up the different pieces (see W-1) to the extent that they need it. Lower end rails all but thickness- side rails - face side, face edge and two ends;- legs,- face side, face edge;- upper end rails not at all as they will be turned.

4- Turn the upper end rails to shape. See W-100. Care must be taken that both upper end rails are the same length between shoulders and agree with the lower rails.

5- Band saw the legs, keeping just outside the lines. Use chisel, gouge and spokeshave to work to outline. Test curved edges for squareness with face side. See W-20. Gage thickness of legs and plane to lines.

6- Patterns are used for both the legs and side rails. Obtain the curve for the side rails and work to line with drawknife and spokeshave. See W-20.

7- Carefully sand legs and side rails.

8- Layout the dowel joints that fasten legs to side rails. See W-112 and sketch. -B-

-B-

9- Glue legs and side rails.

10- Layout the centers for the upper end rails and lower end rails. See sketch-C- Bore holes, cut dowels and glue. Test for squareness.

-C-

11- Place bottom. Use 1¼"-10 F.H. screws.

12- Sponge wood. Sand. Stain. See F-5.

13- Shellac Finish. (F-1) Upholster. (W-40)

QUESTIONS- How do you find the length of the dowels for the joints? What is meant by a paring cut when applied to chisels? What are the precautions necessary to use when applying hot glue? Which face of the doweling jig must be placed against the face sides of the pieces to be joined? What are the precautions necessary to take when using the lathe? When using the band saw?

Designed by Clifford B. Smith, Buffalo, New York.

Wooden Toys in the School Course

F. Clarke Hughes, Spokane, Washington

THE modern wooden toy is peculiarly adaptable to our schoolwork because of its simple construction and its artistic lines and coloring. The wooden toy in its present form is distinctly American, dating its existance from a period soon after the opening of the world war in 1914, when, after many years of using imported toys from European countries, we suddenly found our supply cut off, and we were practically without toys for some months. With the supply thus cut off, our American manufacturers quickly realized that here was an opportunity to develop an industry that had long been in the hands of Germany and other European countries.

But the new industry in the process of being developed and exploited was destined to be also Americanized and made to serve our own needs as well as to meet with our ideals in a large measure. The imported toys which had been largely made of pressed metal and papier-mâsché, were to be replaced by those sawed and shaped out of our native woods. Wood being our most common raw product was, of course, the cheapest material for the purpose. It has another quality also which commends it to the toymaker; the plastic nature of the softer woods makes them especially easy to be shaped to any form.

With the newly developed toy, has come also the new place which it now holds in the life of the child, and the regard with which it is held by the average dealer. There was a time in the not-far-distant past when toys, like fruits and vegetables, were more or less seasonable, to be used and placed on the market at Christmas time, and then to be stored away and forgotten about until the following year. Now, toys may be found on sale in abundance throughout the year, and the children take quite as much delight in playing with their toys in the summer time as they do in the winter months.

Two Very Modern Toys

The two wooden toys shown and described in this article are quite in keeping with the modern wooden toys of today, and if they are made according to directions, should have a very commercial-like appearance when finished. In all cases the commercial models have, first of all, a bright colorful appearance. Sometimes, and in fact in many cases, the structural soundness is overlooked or sacrificed in commercial toys, out of deference to a bright finish. However, toys should possess both the necessary strength and a proper finish and each should receive its full share of consideration.

With models, such as the ones shown in the accompanying illustrations before him, the teacher in the elementary or high school can very easily originate others of like form, and many new models may be planned, conforming as they should to the conditions under which they are to be produced. The duck, for instance, might become a goose, a swan, or a turtle. In place of the rollers being placed in the holes on the under side of the base, they might be made in the form of wheels and be placed on the edge of the base, as shown in Plate No. 4. In place of a dog being used in the kennel, a rooster or any other animal may be substituted. Changes without limit will occur to the resourceful teacher or to his pupils, for pupils are quick to reflect the general characteristics of their teacher and are many times quite as versatile in their original ideas as he. The author gives credit to some of his pupils for many ideas which originated with them.

In Plate No. 3 of the accompanying drawings, the duck should first be traced on a piece of heavy paper or cardboard, using the squares for enlarging the parts. This pattern may then be cut out, after which it can be transferred to a piece of soft white pine or basswood and sawed out with an ordinary coping saw. In a large class where quantity production is desired, these parts might all be marked out and shaped with the band saw, along with the base and other small parts. If these several parts are machined and assembled as a factory project, the pupils will get a great deal of delight as well as instruction out of cleaning up and assembling the finished projects.

The Duck on Wheels

The detail sketches in Plate No. 3 give the sizes and general plan of construction for the duck on wheels and very few other directions will be needed. The mechanical arrangement on the bottom of the base is planned to give a snap or noise not unlike the quack, quack, of a duck. The spring may be made of either a piece of steel spring or a strip of very thin wood. These, in either case, should be adjusted in such a position as to be snapped once each time that the axle turns around. The eccentric may be made of wire of medium size and stiffness. Telephone wire is a very good kind to use. If the ends of the wire axle are slightly flattened and driven into the wheels quite snuggly, they will remain in place. The front wheels should be left loose on the axle.

The Dog in Kennel

In Plate No. 4 the little dog and his kennel furnishes a problem a little more difficult than the preceding one. Nevertheless, it is not too difficult for the fifth or sixth grades. If the parts of the kennel are sawed with a jig, or on the power saw, the model makes a very good problem for the younger boys.

When all of the parts are made up according to the drawings, they should be painted separately and allowed to dry. All but the dog should be assembled, leaving him until the last so that the link, which connects the leg to the eccentric on the axle, may be carefully adjusted. The fit must be very loose so that the movement is easily made. The axle of this model as was the case of the duck, should be made of medium-heavy wire and the wheels driven snugly into place.

In the case of both of these wooden toys, the finish is a very important part of the work. The best finish, is either a good gloss enamel or some of the brushing lacquers. The brighter and glossier the finish, the more valuable the toy. Any of the brighter colors or tints such as the ones suggested on the drawing, will be good to use.

PROBLEMS AND PROJECTS

This department aims to present a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in woodworking, turning, patternmaking, machine-shop practice, sheet-metal work, forging, foundry work, auto mechanics, auto electricity, electricity, architectural and mechanical drafting, printing, bookbinding, concrete work, farm mechanics, home mechanics, and other lines of industrial-arts work are desired for consideration.

TYPICAL JOB SHEET FOR THE AUTO SHOP

Ray F. Kuns, Cincinnati, Ohio

Testing the Ford Model T Piston-Pin Fit

The piston pin is lubricated by oil splashed or thrown up by the lower end of the connecting rod which finds its way into the piston, and thus gets to the piston pin and piston-pin bosses. From this point it is carried by capillary attraction into the piston-pin bearing. The Ford Model T has bronze bushings pressed into the piston-pin boss. The bearing is in these bosses and not in the upper end of the connecting rod, as in many other engines. The piston pin is locked or clamped into the upper end of the connecting rod, as will be noted on the rod lying on the bench shown in the accompanying illustration.

The amount of wear permissible between the piston pin and the piston-pin bushing should not exceed .002 in. The piston pins are fitted with a push fit, which means that perhaps .0005 in. is allowed for lubrication. The pistons being cast iron and the pins of rather small diameter, the wear of them is certain to follow continuous use. If more than the amount of clearance mentioned above exists in the piston-pin bushing, a disagreeable noise will be noticed in the operation of the engine. This is likely to be heard at slow idling speeds.

Procedure:

1. There are several methods in use among mechanics when determining the amount of wear which has occurred on a piston pin or in a piston-pin boss or bushing. Figure 37 illustrates the method recommended by the Ford factory for determining this wear.

2. The piston is laid on the bench top and held solidly in the left hand. The right hand grasps the connecting rod and exerts an up-and-down prying motion, while holding the upper end of the connecting rod against the lower piston-pin boss. This motion has the effect of throwing the piston pin forth and back in the piston-pin bushing. This movement can be noticed with the eye. Oil present in the bushing will be squeezed out and forced around from one side of the pin to the other in the bushing.

TESTING PISTON FIT

3. The up-and-down movement of the big end of the connecting rod may be as much as ⅛ to ¼ in. without any up-and-down motion for the small end. This means, of course, that there is considerable wear in the piston-pin bushing, otherwise the motion of the big end would not be visible.

4. Another method of testing is to grasp the connecting rod in the vise. The piston is then grasped between the two hands and twisted forth and back, while being held against the upper end of the connecting rod, to prevent side motion on the pin. This gives the same effect as that obtained by the other method of testing, and the action of the oil and play visible around the end of the piston pin shows how much wear has taken place. A little experience will soon show the characteristic movement of a badly worn piston pin.

MONKEY WRENCH

Alfred Grayshon, Jay Cooke Junior High School, Philadelphia, Pennsylvania

Small projects are always in demand in the general metal shop. The projects chosen should involve a minimum of machine work, but at the same time, embrace a general group of operations, and the finished job should possess a utilitarian value.

The monkey wrench described herewith requires some machine work on the lathe and drill press. It necessitates a fair amount of vise and bench work. Although the finished product does not compare with a commercial monkey wrench, it does have a utilitarian value to the boy.

Materials required:

1 piece round cold-rolled steel 5/16 by 12¼ in., for the handle.

2 pieces flat cold-rolled steel ½ by ⅝ by 2⅛ in., for the jaws.

1 piece round cold-rolled steel ¾ by ½ in., for the nut.

Operations:

Handle

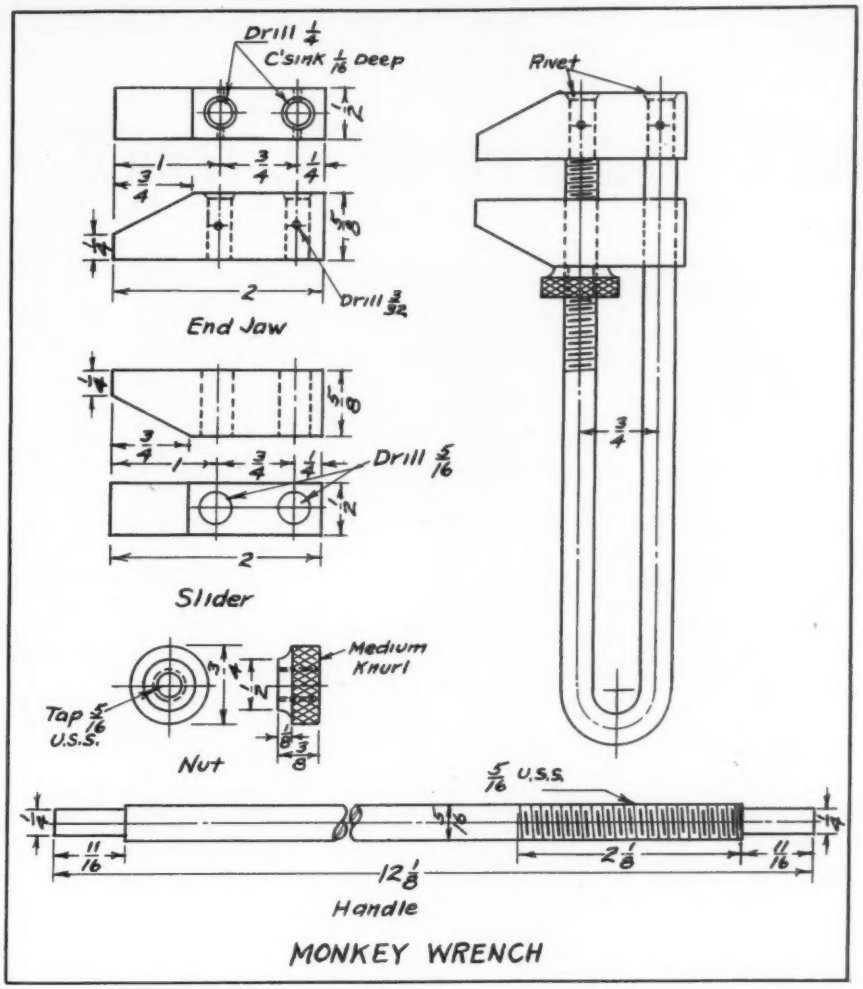
1. Cut the stock.
2. Face the ends to length.
3. Turn the ends.
4. Thread one end with a stock and die.
5. Heat the center red-hot.
6. Carefully start the bend (be careful not to damage the threads while doing the bending).
7. Reheat and finish the bend so that the ends are even.
8. Clean off the surfaces with a file.

End Jaw

1. Cut the stock.
2. File square to the proper length.
3. Locate and center-punch for the holes.
4. Drill the holes.
5. Countersink the holes as shown.
6. Lay out the bevel.
7. Hack-saw or chisel the bevel allowing for finish-filing.
8. File the bevel.
9. Finish-file all surfaces flat and smooth.

Slider

1. Cut the stock.
2. Square the ends.
3. Spot-drill, using the end jaw as a gauge.
4. Drill the holes.
5. Lay out the bevel.



6–7–8. Same as Nos. 7, 8, and 9 operations of the end jaw.

Nut

1. Chuck a piece of ¾-in. round stock.
2. Face one end.
3. Turn the recess.
4. Spot and tap-drill in the chuck deep enough for one piece.
5. Cut a medium knurl on the circumference.
6. Part or saw, allowing for finish.
7. Chuck with the knurl protected and face.
8. Tap the hole.

Assembly

1. Thread the nut on the handle.
2. Place the slider on the handle.
3. Place end jaw on the handle.
4. Peen the ends of the handle to fill the countersink.
5. Center-punch and drill for the pins through the side of the end jaw.
6. Drive in the pins and rivet them tight.
7. Finish all surfaces even.

Remarks

When selecting the sizes of the stock given in the foregoing, allow for finish where it is required.

Another method of making the nut is as follows:

1. Cut the stock.
2. Chuck and face the ends to size and recess.
3. Drill and tap.
4. Use the screw as an arbor and cut a medium knurl on the nut.

A bending jig can be used to advantage for making the handle bend, if the project is going to be made by a number of boys.

A PUZZLE BOARD FOR CHRISTMAS

Raymond G. Steeves, Willis Rural High School, Willis, Kansas

This puzzle board is very easy to make and I found it very interesting to boys of various grades, and older folks like it, too.

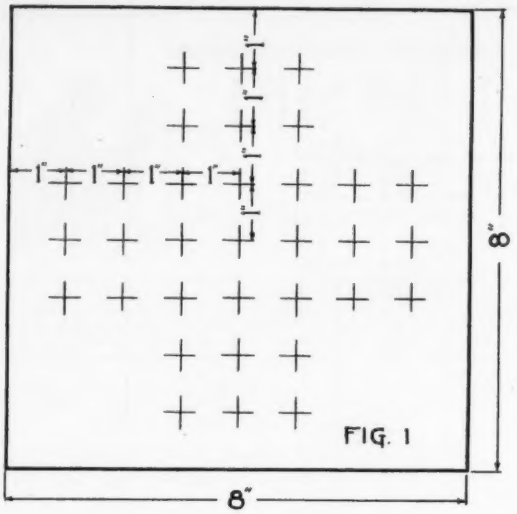
The stock needed is one piece 1 by 8 by 8 in. and 32 dowel pins ⅜ in. in diameter by 1¼ in. long. We had best success using oak wood. The 1 by 8 by 8 in. piece is squared up and the centers of the holes are marked, as shown in Figure 1.

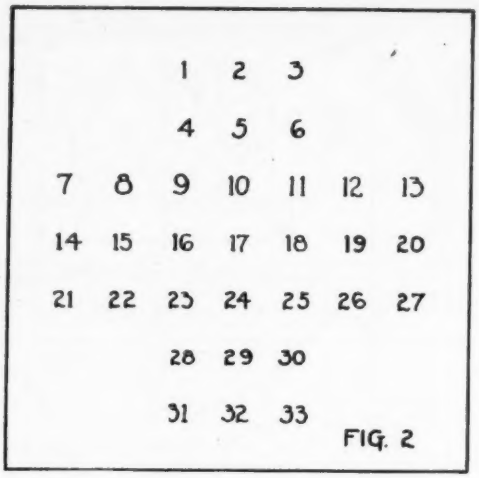
The top edge of the board may then be chamfered, to give it a neater appearance, and then the 32 ⅜-in. holes are bored ⅜ in. deep.

If dowel pins are not available, they may be made by driving small pieces of oak or other hard wood through a ⅜-in. hole bored in a piece of iron or steel. Best results will be obtained if the stock is dressed round, and only slightly larger than the hole in the iron, before driving it through. The pins, after they are driven through are rather rough, and they must be sanded smooth before they are used. They will then be about the proper size to fit the holes loosely so they may be easily removed.

To work the puzzle, place a dowel pin in each hole except in the center one. The game is played by jumping one pin with another and taking out the one jumped the same as checkers. No jumping can be done cornerwise. The object is to finish up with only one pin left in the center hole. It is not quite as easy to do this as it looks. Better try it.

The solution, however, is rather simple. It is worked as follows: For convenience I have placed numbers where the holes are located. (See Fig. 2.)





Jump 29 to 17, 26 to 24, 33 to 25, 31 to 33, 18 to 30, 33 to 25, 24 to 26, 27 to 25, 22 to 24, 24 to 26, 13 to 27, 27 to 25, 12 to 26, 26 to 24, 9 to 23, 28 to 16, 7 to 9, 21 to 7, 10 to 8, 1 to 9, 3 to 1, 6 to 4, 8 to 10, 1 to 9, 10 to 8, 7 to 9, 16 to 7, 23 to 10, 11 to 9, 4 to 16, 15 to 17, leaving one pin in the center.

The puzzle board may be given a simple stain or shellac finish, to improve its appearance, and to keep it from becoming soiled.

The board might also be laid out in squares. Checkers may then be used instead of the dowel pins.

A similar game known as the Red Cross Solitaire Board was described on Page 113 of the March, 1918, issue of the INDUSTRIAL-ARTS MAGAZINE. Four other games that can be played on the board also are described in that article.

THE WIND METER

D. E. Kellogg and W. A. De Vette, Erie, Pennsylvania

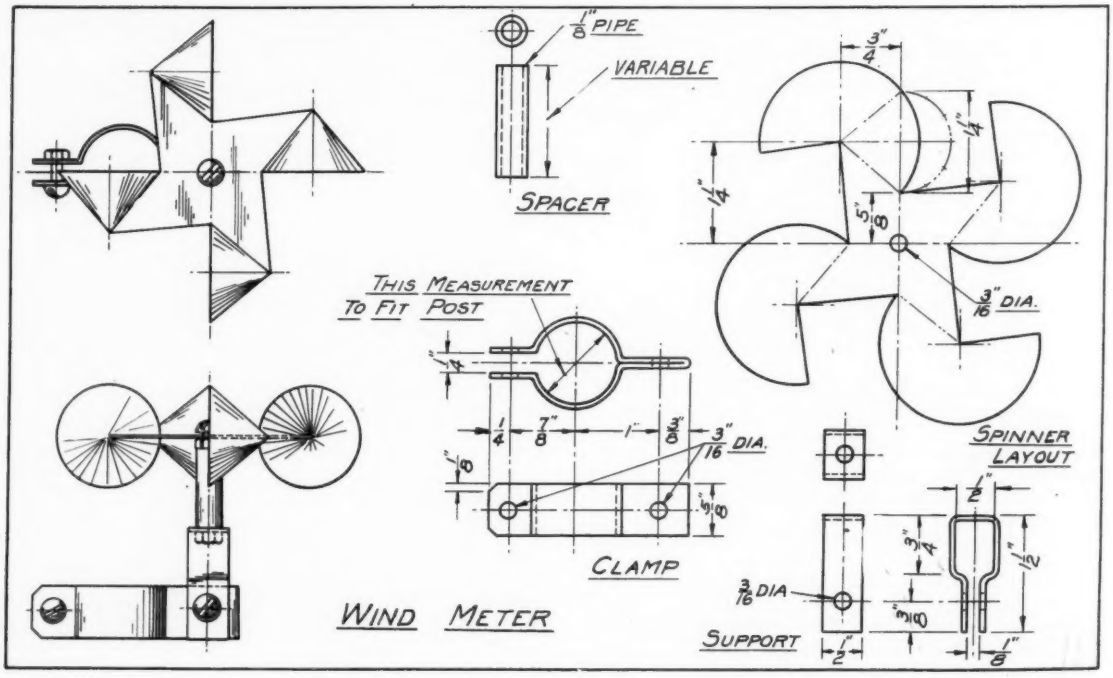
This project will be of interest to every schoolboy who owns a bicycle and wants an ornament for his steering post.

The drawing is self-explanatory. None of the operations are too difficult for the general-shop pupil with the possible exception of laying out the pattern with sufficient accuracy. This difficulty may be overcome by allowing these students to use the master pattern, a practice common to many general shops.

Note the lock nut at the upper end of the spacer to keep the screw from pinching the spinner. This will necessitate that the spacer screw be threaded full length.

Bill of Material

1 pc. 4 ½ x 4 ½ IX Bright tin	Spinner
1 pc. ⅛-in. Pipe, variable length	Spacer
1 pc. ½ x 4 No. 16 Gauge Strap Iron	Support
1 pc. ⅝ x 7 No. 16 Gauge Strap Iron	Clamp
1 No. 8-32, Machine Screw (Length to suit)	Spacer Screw
1 No. 8-32 by ½ in. Machine Screw	Clamp Screw
3 Nuts, No. 8–32	



The Flowing Tie

How fortunate for the boy in the above picture, that the lathe was revolving slowly and that he could reach the shipper and stop the machine. An ugly gash, or even a broken neck might have resulted if the machine had not been stopped.

There are many places where this boy's tie could get caught: in gears, grinder, drill press, miller, pulley, around shafts, etc.

Tuck the long tie into your shirt, or better yet, take it off while you are in the shop.

Safety Series — Earl L. Bedell and George Peacock, Detroit, Mich.

© Industrial-Arts Magazine

WORK

One of the greatest mysteries in the world is the success that lies in *conscientious work.*

—Calvin Coolidge.

No man is born into the world, *whose work is not born with him.* There is always work, and tools to work withal *for those who will;* and blest are the horny hands of toil.

—James Russell Lowell

No thoroughly occupied man was ever yet very miserable.

—Landor

Make yourself *necessary* to the world, and mankind will give you bread.

—Emerson

Labor conquers all things.

—Homer

It is worth your while to prepare for worthwhile work.

Men are valuable just in proportion as they are *able* and *willing* to work in harmony with other men.

—Elbert Hubbard

Work first, then rest.

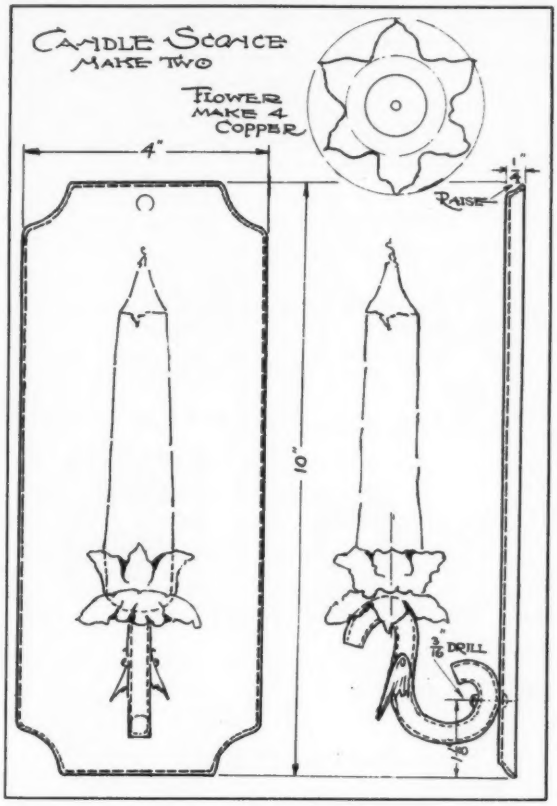
—Ruskin

© Industrial-Arts Magazine

COPPER CANDLE SCONCES

Gerald A. Boate, Seattle, Washington

The copper candle sconces described herewith, are made of strips of No. 00 or 16-oz. copper, each 4½ by 10½ in. Commence by filing all edges smooth. Then cut a curve, which has a ⅜-in. radius, out of each corner. Next, carefully heat the piece red-hot and submerge in water to soften it, so



that it may be formed more easily. Select a close-grained hardwood block about 2 in. square and 9 in. long and with band, or hand coping saw, cut off the end so that the sweep will have about a ⅜-in. radius. Mount this block vertically in the vise jaws with the curved end upward, then with the peen end of a 12-oz. machinist's hammer, beat lightly near the edges all around until the edges bend inward leaving the top flat. Test occasionally on the bench top or on a bench block to see that the edges are even. If the copper hardens too much, heat it red-hot again and quench it in clean water. Hammering hardens copper, while heating it red-hot and quenching softens it. File off any irregularities which appear on the under edge.

Then laying the face side downward, locate the centers of the holes with a center punch, one hole ½ in. from the top and another 1⅛ in. from the bottom, both being located on the vertical center line. The upper hole is to be ¼ in., and the lower one 13/64 in. in diameter. Fasten the candle cup and arm to the back of the sconce with a 3/16 by 3/16-in. r.h. stove bolt. The arm is made out of a piece of sheet copper ¾ by 4 in. which is rolled circular in section by hammering, and then bent into an "S" shape. A 13/64-in. hole should be drilled about 1 in. from each end for the fastening bolts.

For the candle cup and rose, two disks of copper must be cut, about 2½ or 3 in. in diameter. These disks must first be annealed. Next, a paper pattern of a five- or six-petal flower is to be pasted on. The inner part of the petals where they join may be cut out by drilling, while the remainder may be trimmed with tinners' snips. Having the petals cut out, center-punch the cup and the flower and drill a 13/64-in. hole through the center of each. Then cup the petals by beating with a ball-peen hammer holding each flower flat on a block of soft wood in which a ¾-in. hole has been bored. This recess will permit the metal to sink downward when hammered. After the cup and flower have been shaped, fasten them to the arm with a 3/16 by ½-in. stove bolt. The copper flower is soft from annealing and may be bent to the desired shape with the fingers. The finished sconce may be dipped or treated with butter of antimony to give an antique effect, or it may be thoroughly washed and finished with brushing lacquers and bronzing powders. With a little ingenuity, these candle sconces may be converted into an electric candle light.

SEWING CABINET

C. M. Rice, North Junior High School, Everett, Washington

(See Supplement No. 155)

The object sought in designing this sewing cabinet is to combine the familiar "Martha Washington" type of cabinet with earlier period designs. This design is offered as a suggestion for adapting this type of cabinet for use with furniture of other periods. The cabinet has two drawers for thread, etc., and a compartment at each end for unfinished work. The legs are Elizabethan in character and are tied together near the base with a serpentine stretcher.

Construction

Cabinet. The cabinet may be constructed as a unit and the legs applied later. Oak was used in the project for all parts. The bottom of the cabinet was made first, next the framework for the drawers, and later, the end compartments were boxed in. The drawers may be made next if desired.

THE COMPLETED CABINET

Legs. Two pieces of square stock, slightly larger in cross section than the bulbous turning and about 19 in. long, are taken and ripped in such a way as to leave a 1-in. core at each end. The section that is to receive the "Cup and Bowl," of course, must be left. Finish each leg and cut a tenon at each end.

Feet. Make the feet and cut a mortise in the center for the legs. Fit together and glue.

Stretchers. Mortise through the legs, drive the stretchers in place, and fasten with wooden pegs and glue.

Join the cabinet to the legs with mortise-and-tenon joints. The corner blocks are placed next. The top is then made and fastened down.

Finish. After the project has been sanded and stained, various high lights may be rubbed in with fine sandpaper.

The drawer knobs should be of old brass. These are put on to add character to the piece.

COASTING BOBS

D. E. Kellogg and W. A. DeVette, Erie, Pennsylvania

(See Supplements Nos. 156 and 157)

It is during the early winter months that the woodworking instructor casts about for projects which carry a seasonal

appeal. The coasting bobs illustrated in supplements Nos. 156 and 157 meet this need and at the same time involve many of the principles which the instructor wishes to put over in his classes. The bobs, furthermore, may be worked on by several boys at one time. This helps the teacher solve, for a time at least, the problem of assigning jobs to those boys who are better workmen than the average of the class and are difficult to keep employed.

In addition to woodwork, the project involves a few operations in bench metal work and drill-press work.

The illustrations include many of the terms ordinarily used in industrial shops, and furnish valuable practice in blueprint reading.

The bobs may be made of any tough or close-grained wood, preferably oak or ash. Construction should be started on the sleds which should be made simultaneously, as many operations in the one also occur in the other. This will save much time in getting out, replacing, and setting up tools.

The bill of materials, in the main, is so arranged as to call for the parts in the order in which they are to be made or used.

When the sleds are ready for the putting on of the shoes, the latter should be heated at both ends and the grooves burned into the runners. The shoes must also be bent around the ends of the runners. They must then be taken off, reheated, flattened at the extreme ends, and drilled for the screw holes, either by using a breast drill or the drill press in the machine shop if one is available.

The assembling of the rear end is quite a complicated process which calls for considerable planning.

When the bobs have been completed they should be given a coat of oil as no surface finish will stand the type of usage which such a pair of bobs will receive.

Bill of Material

		Part Number
2 pc.	⅞ x 5 x 36	Front Runners	1
2 pc.	⅞ x 2 x 14	Beams	2
1 pc.	⅞ x 9 x 18	Sand Board	3
2 pc.	¼ x 53	Shoes	4
1 pc.	⅛ x 9 x 9	Turning Plate	5
4 pc.	¼ x 1½	F.H. Stove Bolts	6
4 pc.	¼-in. Std.	Square Nuts	7
4 pc.	⅜-in. Diam. x 4¾	Carriage Bolts	8
4 pc.	⅜-in. Std.	Hexagon Nuts	9
4 pc.	⅜-in. Std.	Washers	10
6 pc.	1¾ No. 10	R.H. Blued Screws	11
4 pc.	5/16 x 2¼	Carriage Bolts	12
4 pc.	5/16-in. Std.	Square Nuts	13
2 pc.	⅞ x 5 x 48	Rear Runners	14
3 pc.	⅞ x 2 x 14	Beams	15
2 pc.	⅞ x 2½ x 30	Sand Board	16
2 pc.	¼ x 65	Shoes	17
6 pc.	⅜ x 4¾	Carriage Bolts	18
6 pc.	⅜-in. Std.	Hexagon Nuts	19
6 pc.	⅜-in. Std.	Washers	20
6 pc.	1¾ No. 10	R.H. Blued Screws	21
6 pc.	5/16 x 2¼	Carriage Bolts	22
1 pc.	⅞ x 10½ x 98	Top Board	23
1 pc.	⅞ x 3½ x 20	Foot Board	24
1 pc.	2 x 3⅜ x 10	Front Bolster	25
1 pc.	1½ x 3 x 10	Rear Bolster (Top)	26
1 pc.	1½ x 3 x 10	Rear Bolster (Bottom)	27
1 pc.	2 x 2½ x 10	Truss Brace	28
2 pc.	5/16 x 4½	Carriage Bolts	29
2 pc.	5/16 x 3¾	Carriage Bolts	30
5 pc.	5/16 x 2½	Carriage Bolts	31
12 pc.	5/16-in. Std.	Square Nuts	32
12 pc.	5/16-in. Std.	Washers	33
2 pc.	¼ x 1⅝	Eye Bolts	34
2 pc.	¼ x 3	Eye Bolts	35
8 pc.	¼-in. Std.	Hexagon Nuts	36
8 pc.	¼-in. Std.	Washers	37
1 pc.	⅜ x 9½	Rocker Pin	38
2 pc.	¼ x 82	Truss Rods	39
1 pc.	⅞ x 4 x 5	Turning Bracket	40
1 pc.	27 in. long	Sash Chain	41
1 pc.	½ x 6¼	Carriage Bolt	42
2 pc.	½-in. Std.	Hexagon Nuts	43
1 pc.	½-in. Std.	Washer	44
2 pc.	5/16 x 3	Carriage Bolts	45
2 pc.	5/16-in. Std.	Square Nuts	46
2 pc.	5/16-in. Std.	Washers	47

DECORATIVE DESIGNS FOR CARDS

D. Elizabeth Roberts, Philadelphia, Pennsylvania

One single design will often serve many purposes, and all of the designs illustrated are of such a character that they may be used in many different ways.

These designs are suitable for greeting cards or folders, but they may be easily adapted to the decoration of small cards or novelties, as place cards, menu cards, calendars, small boxes, memorandum books, blotters, etc.

The design should first be drawn in India ink. Then a zinc etching may be made of it and the printshop can produce as many cards with the same design as may be desired. Or the design may be drawn directly on white or tinted cardboard, which is cut to the required size. Then it may be tinted, either with color plates in the printing press, or with water colors put on by hand.

DESIGNS FOR GREETING CARDS
The originals measure 4 by 5 in.

The designs shown in Figures 1, 2, and 3, if reduced, would make attractive place cards, leaving a small strip of cardboard at the lower part for the name. They may also be used for candle shades, repeating the motif as often as necessary and connecting the different parts by lines or bands.

In Figure 1, the daffodils should be tinted yellow with shades of green for the leaves and the basket in some bright harmonizing color.

Figure 2 is pretty with its various colored conventional flowers, its gayly colored basket, and bright butterfly on the handle.

Figure 3 is attractive with its pink blossoms and leaves of different tones of green, and the lantern in some bright color or combination of colors.

Figures 1 and 2 could also be adapted to the decoration of menu cards, memorandum, or address books, and other small novelties.

Figure 3 would make a good folder with a greeting written below the blossoms, or it would be suitable for a small blotter, with some appropriate wording, as "To blot out all but fond memories." It would also make an attractive envelope sachet.

Figure 4 could be used for a calender with a calendar pad pasted below the design, or it would be a good decoration

for a small box. The flowers should be white with yellow centers and the leaves different tones of green. The wood warbler should have bright-yellow plumage, with touches of brown for the shadows. The outer edge and circular band could be tinted gold or a bright harmonizing color.

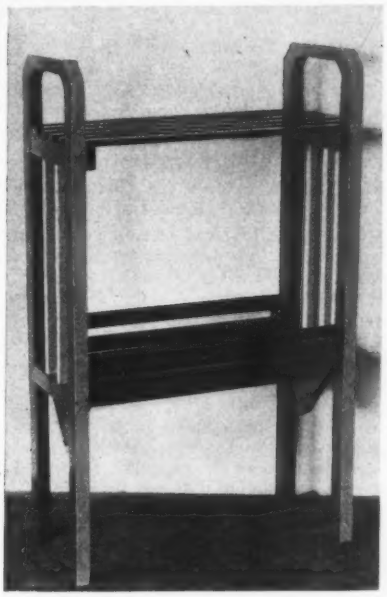
Figure 5 may be used as a card or folder, and as a birthday or congratulation card, as well as a vacation card. The sails of the ship could be left white or tinted a pale yellow, the boat a yellow-brown or green, the waves in color or gold, and the moon and stars in gold or bright yellow.

Figure 6 may be used as a congratulation or birthday card or as an envelope sachet. An orange or blue tint should be used at the horizon, the path should be yellow, the house white with brightly colored roof, the trees and grass tones of green, with bright flowers in the foreground, and the sun red or gold.

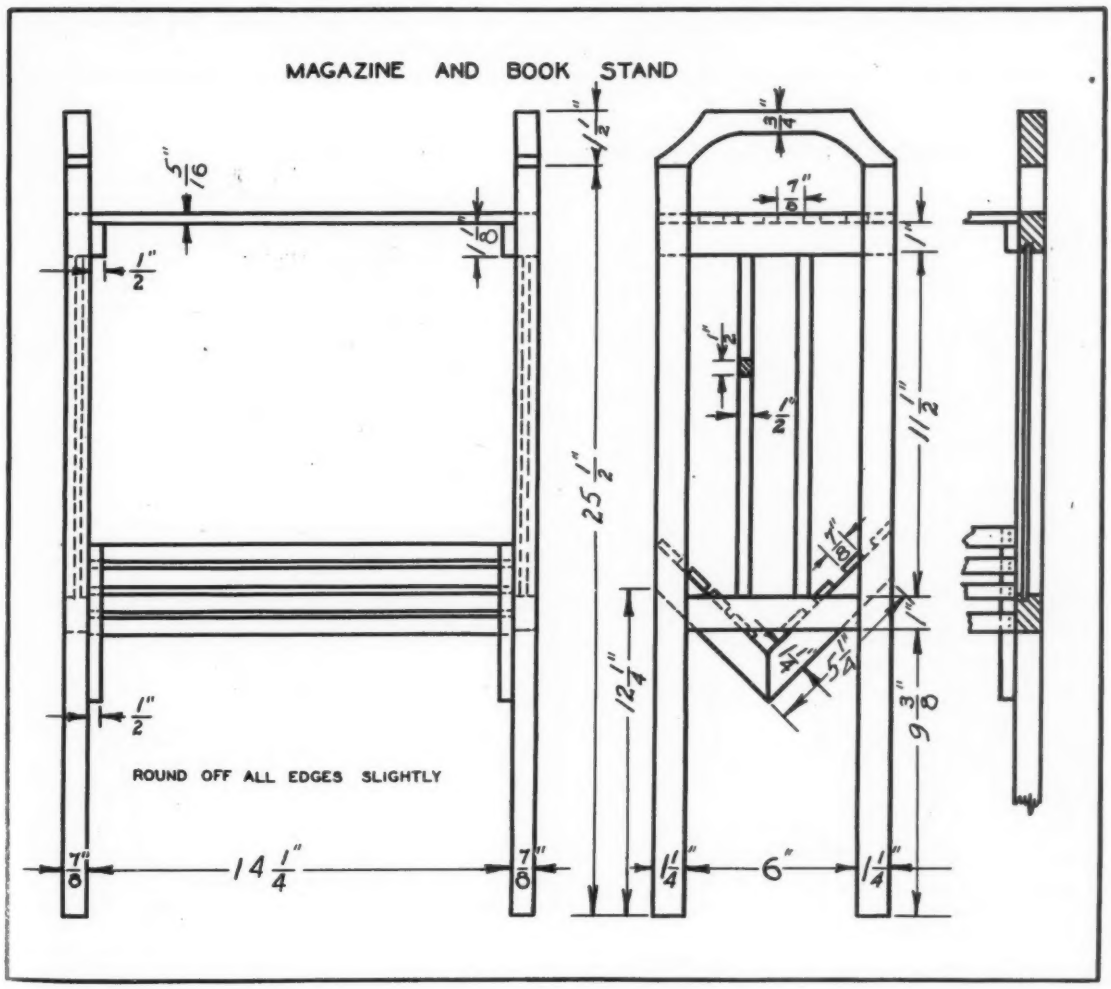
MAGAZINE AND BOOKSTAND

J. I. Sowers, Director of Vocational Education, Miami, Florida

We have found the project illustrated herewith very interesting and quite satisfactory. It permits the teacher to present a number of very fine problems in construction, and it is interesting to the student because it is really a fine bookstand which he can use for his favorite books, magazines, and reference material. Another point in favor of this project is that it takes very little stock. As a matter of fact, the odds and ends of lumber left from making larger projects may be conveniently used in its construction.



MAGAZINE AND BOOKSTAND



This model has always been a "paint job" with us, and some of the students have been able to get very good color combinations.

The slats forming the two bookshelves are nailed to their supports. The supports for the slats are screwed to the uprights. Other joints are made with dowels and mortise and tenons. If the stand is to hold a certain set of books, the dimensions for it must be altered to suit conditions.

WHISK-BROOM HOLDER

Edward Stein, Adjustment School No. 50, Buffalo, New York

This project, as illustrated, is just difficult enough to make it a fine problem for the older groups in sheet-metal work. The job requires efficient manipulation of tools and equipment, and mental and manual skill to make an accurate development. The making of the whisk-broom holder covers the use of the brake, bar folder, and forming machine, and the use of the solid punch and prickpunch. The method of fastening sheet-metal parts with the prickpunch also is employed in this project. It is a popular project with the boys, and most of them want to make more than one.

No. 28 gauge charcoal tin plate, black or galvanized iron, or copper may be used as the material. The problem may be worked up in a number of different designs.

By having the student make a regular mechanical drawing first, and then transferring this drawing to the metal, saves time for the student and also for the instructor.

The pattern of the back is laid out first. A 3/16-in. hole for hanging the project is punched as shown, and the ⅜-in. lap is folded over but not flattened. Then the pattern of the front is laid out and cut. The hems are folded first and then the front is rolled with the hems on the outside. The ½-in. sides are bent out straight, on an angle of 90 degrees, in the brake. The front is fitted to the back and the ⅜-in. laps flattened down tight. To secure the front permanently, prick-punch marks are made on the ⅜-in. laps through the three thicknesses of metals.

After smoothing off all edges and corners, and after shaping the front, the holder is ready for the decorative touches. Either gesso, polychrome, or enamel may be used for this purpose.

If made of copper, the metal may be given a hammer finish, or an appropriate design may be etched on it.

DONT'S FOR THE ELECTRICAL SHOP

H. S. Rich, Rogers Junior High School, Jamestown, New York

Don't connect bells directly to any light or motor line.

Don't touch a brass socket with wet hands.

Don't place electrical apparatus near water tubs, sinks, or unprotected out of doors.

Don't use brass sockets in the basement. It is too risky. Use porcelain instead.

Don't use flexible lamp-cord wire to cross the ceiling as a line. It is to be used for pendant lamps only.

Don't leave the doors of the power and panel boxes standing open. It is better to close and lock them.

Don't touch any size of wire dangling on the street. It may carry a current of dangerously high voltage.

Don't increase the capacity of a fuse without knowing all of the conditions.

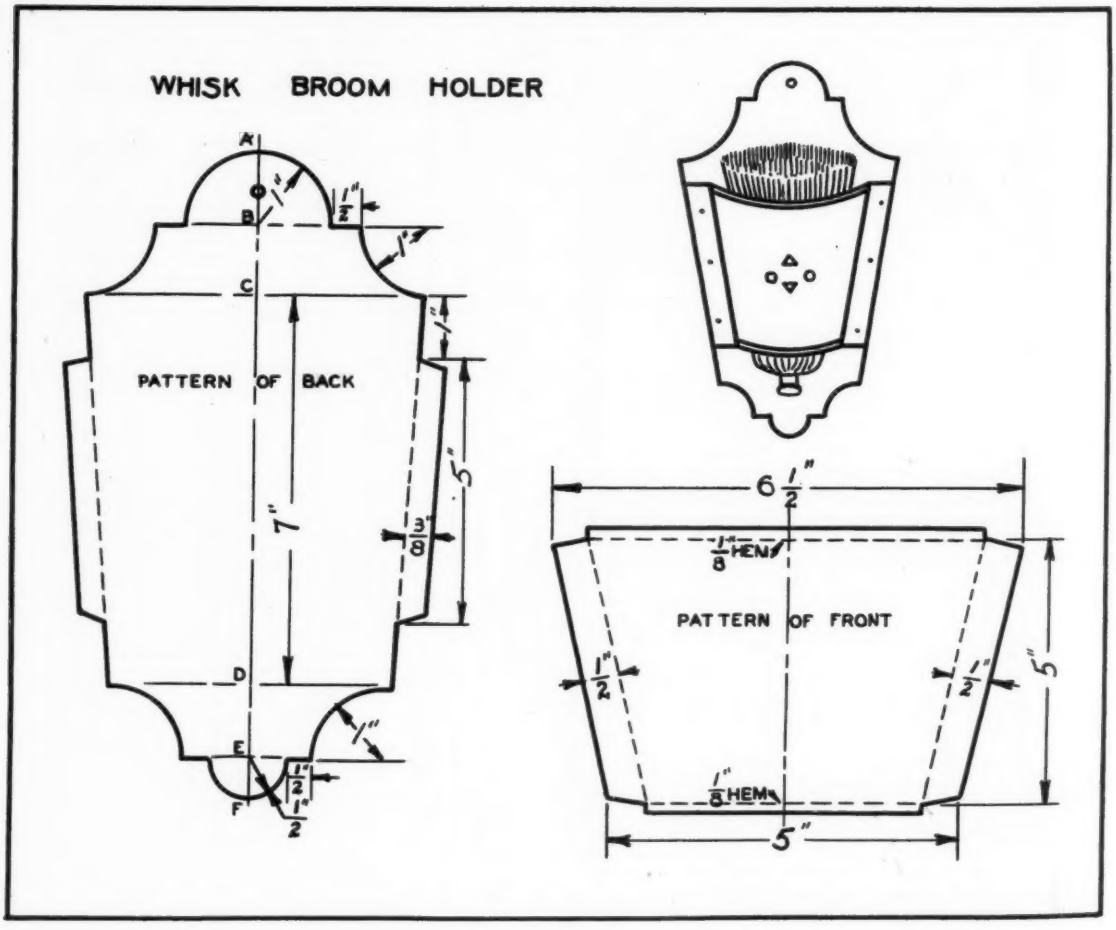
Don't install a receptacle in the floor without having the proper kind of fitting.

Don't use portable heaters which draw over 6 amperes.

Don't pull on the wire of an attachment plug. Take hold of the plug itself.

Don't put up a radio aerial without connecting it to the ground with a lightning arrester.

Don't use flimsy extension cords. They should be selected for rough usage.



Don't place receptacles and switches in garages at less than 4 feet from the floor.

Don't lay lamp cord or lamp wire on a metal pipe or over a sharp edge.

Don't use the telephone during a lightning storm.

Don't install an aerial over a light or power line outdoors.

Don't touch a pipe or a radiator while lighting an electric lamp.

Don't touch an electric socket while you are standing in water in the bathtub.

Don't use cheaply made electrical apparatus and fittings. They are liable to short circuit or become grounded.

Don't use paper as a shade around a lamp.

Don't unscrew a lamp from its socket while the current is on. An arc may be drawn inside.

Don't use iron or copper wire as a substitute for a fuse.

Don't touch the main switch or the main fuse in the cellar while you are standing on the damp ground.

Don't forget to shut off the current of a heater or a flatiron.

TRACING THE JOB THROUGH THE PRINTSHOP

Charles L. Detrick, J. Sterling Morton High School, Cicero, Illinois

Sometimes it is necessary, in case of shortage or spoilage on a job, to trace the operations through from the time the job enters the shop until it is delivered. To do this, requires a series of checking slips, especially in the school shop which accommodates three or four classes each day.

J. STERLING MORTON HIGH SCHOOL
Department of Printing

NOTICE—Keep all copy, proofs, manuscript, checking slips and other papers belonging to this job within this envelope, and return the envelope to the instructor before you leave the room at the end of the class period.

Job No..... Quantity.....
For .....
Ordered by..... O. K.....
Name of Job.....
Kind of Composition.....New.....Reprint.....
No. of Impressions.....
Received.....When Wanted.....Delivered.....
Stock .....

INFORMATION	ESTIMATED COST
Kind of Stock.....	Composition .....
Number Full Sheets.....Size	Cutting Stock.....
Cut to Make.....Size	Press Work.....
Color of Ink.....	Printing Ink.....
Proof to.....	Distribution .....
	.....
	.....
	Stock .....
	.....
	COMMERCIAL VALUE

FIG. 1

COMPOSITOR'S CHECKING SLIP
J. Sterling Morton High School
Printing Department

Job No.....
Description .....
Copies ordered.....

Composition

Hand .....to..... .....hours
Compositor .....
Machine .....to..... .....hours
Operator .....

Lockup

Time .....to....., ...hours
Stoneman .....
Total time (ready for press).....
Date.....

FIG. 2

The system herewith described has been in use in the J. Sterling Morton High School shop for over two years. It has helped us frequently to trace errors or blunders and place the blame where it belongs.

CUTTER'S CHECKING SLIP
J. Sterling Morton High School
Printing Department

Job No.....
Description .....
Copies ordered.....
Kind of Stock.....
No. Full Sheets.....Size.....
Cut to make.....Size.....

Cutting Diagram

Cutter .....
Date.....

FIG. 3

Figure 1 shows the job envelope which is filled out by the instructor. It is an ordinary 6 by 9 manila open-end envelope in which all copy, proofs, checking slips, etc., are filed. It follows the job through all the different operations and is filed for future reference. The top lines of the checking slips may be filled out by the class secretary, or shop foreman. They are then pinned to the envelope in the order in which they will be received. The compositor's slip (Fig. 2) is first completed and placed within the envelope. The cutter's slip (Fig. 3) may be filled out completely by the instructor and the cutting diagram drawn. The feeders use the slip shown

FEEDER'S CHECKING SLIP
J. Sterling Morton High School
Printing Department

Job No.....
Description .....
Copies ordered.....

Lockup

Stoneman .....

Make-Ready

Pressman .....
Make-ready .....to.....

Feeding

Feeder .....
Counter reading.....to.....
Number run.....
Time .....to....., ...hours
Date.....

FIG. 4

in Figure 4, and a separate one should be made out for every feeder who works on the job. Different colored papers are used for feeder's checking slips for the various presses so that the job also can be traced to the press on which it was printed.

When the job is delivered the cost is estimated, a value is placed on the job, and the envelope is filed.

MAGAZINE-BASKET DESIGNS

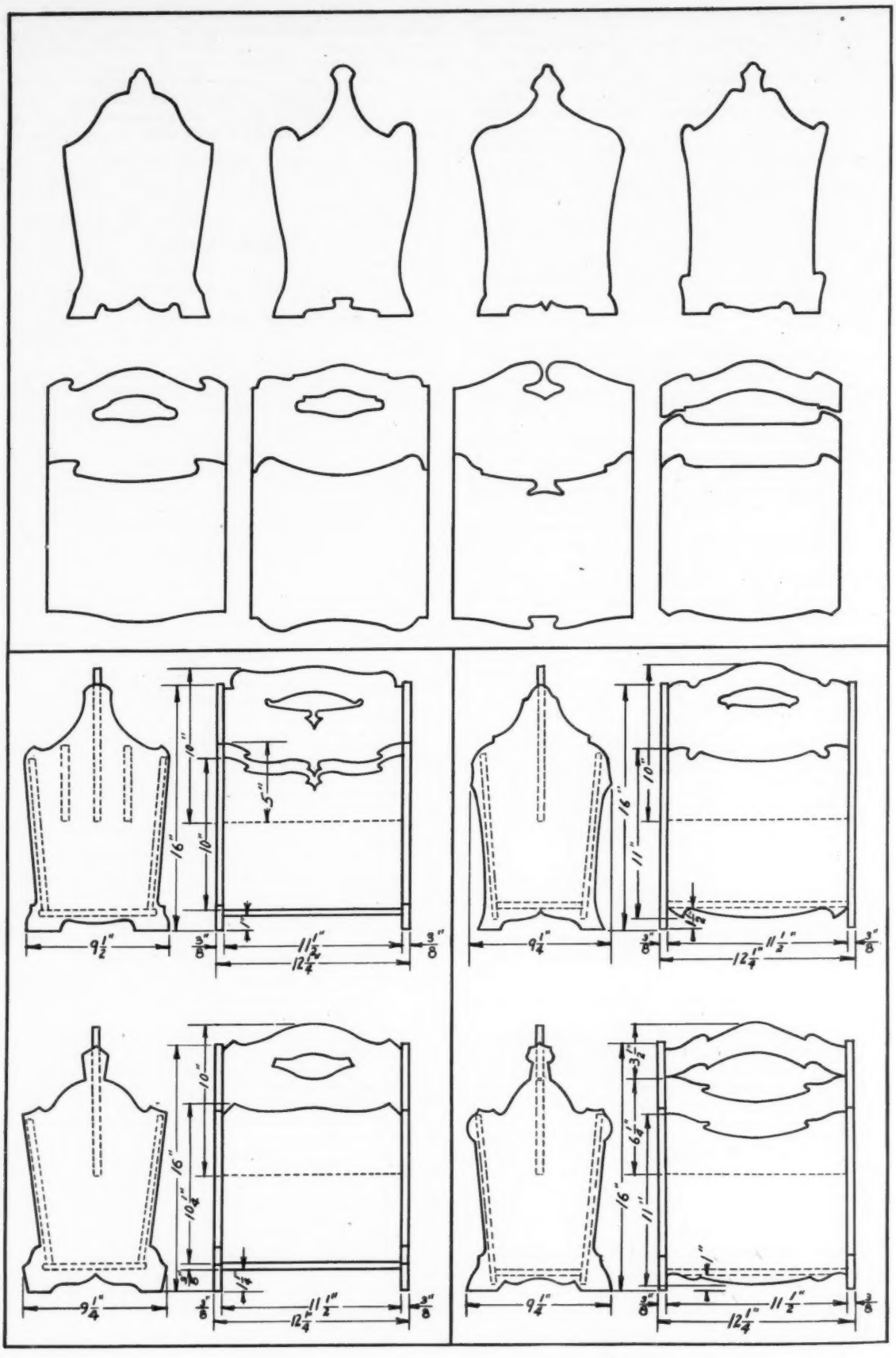
Martin W. Peterson, East High School, Youngstown, Ohio

(See Designs Overleaf)

The magazine basket is a popular piece of furniture and most of our boys want to make it. In many shops we find the same designs copied and finished practically all alike. To avoid having your project become trite and uninteresting in the minds of the students, and to impress upon them an "eye" for design, the drawings submitted herewith will be of interest.

These baskets can be made of plywood, basswood, poplar, or any wood that has a close grain. The finish that has proved most effective is a lacquer coat over a sanded lacquer sealer. Fast-drying enamel also makes a satisfactory finish. As a further means of decoration, a border-line stencil could be made, or decalcomania transfers could be applied.

The true value of this project to the student is that it involves the need of squaring four or more boards to the same length. Together with this comes free-hand design and an opportunity to introduce late finishes and modern methods of applying them.



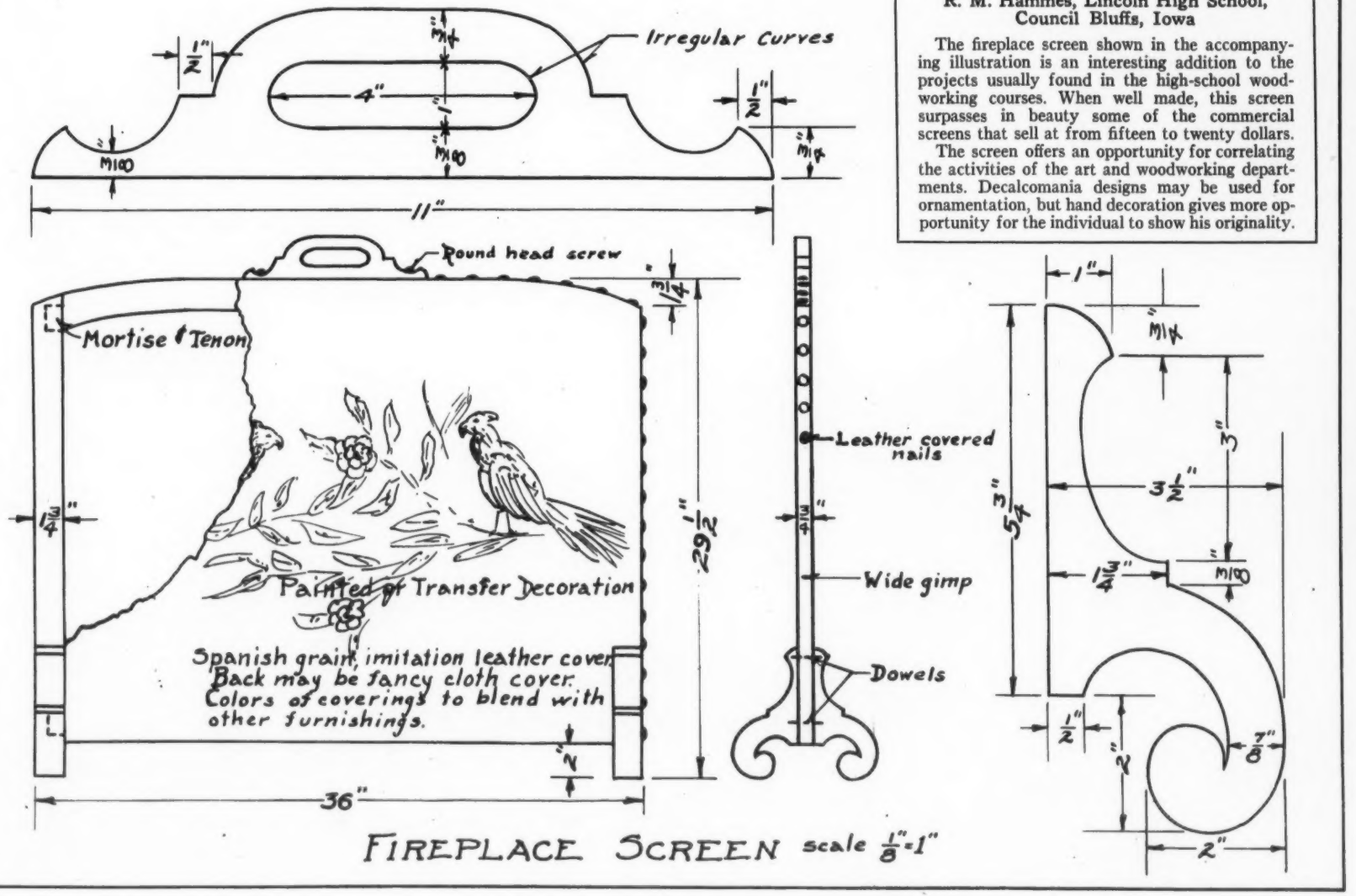
DESIGNS FOR MAGAZINE BASKETS (See Preceding Page)

A FIREPLACE SCREEN

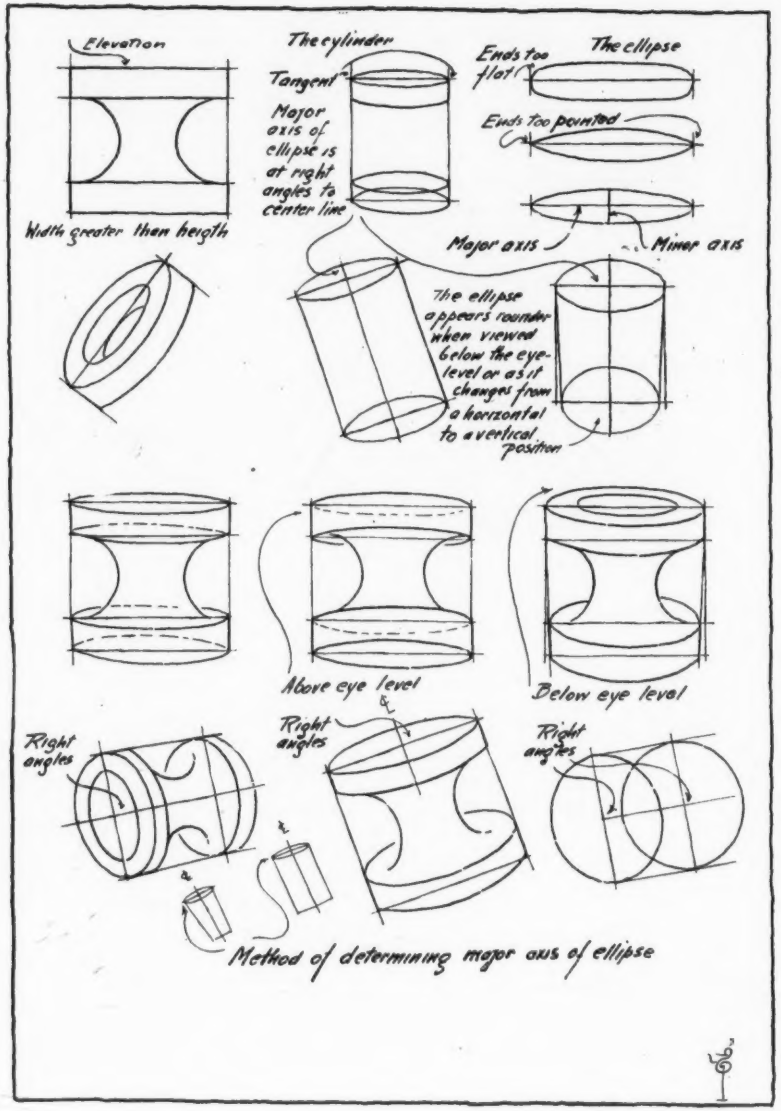
R. M. Hammes, Lincoln High School, Council Bluffs, Iowa

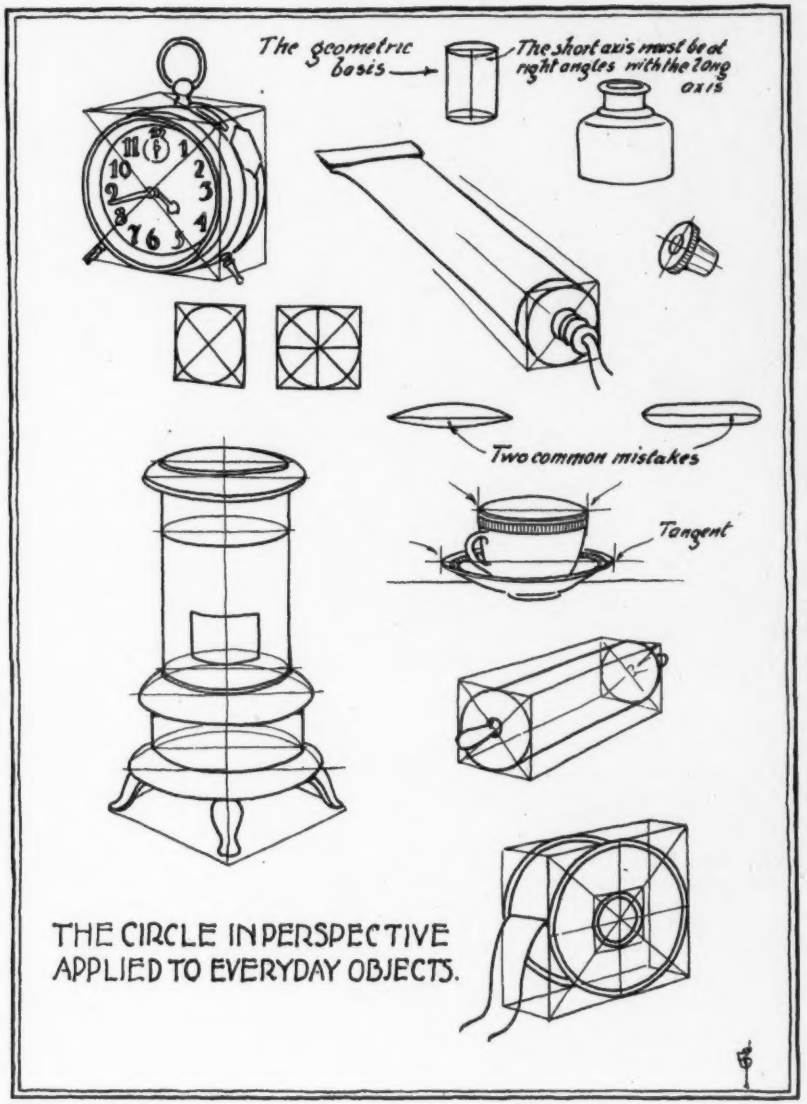
The fireplace screen shown in the accompanying illustration is an interesting addition to the projects usually found in the high-school woodworking courses. When well made, this screen surpasses in beauty some of the commercial screens that sell at from fifteen to twenty dollars.

The screen offers an opportunity for correlating the activities of the art and woodworking departments. Decalcomania designs may be used for ornamentation, but hand decoration gives more opportunity for the individual to show his originality.

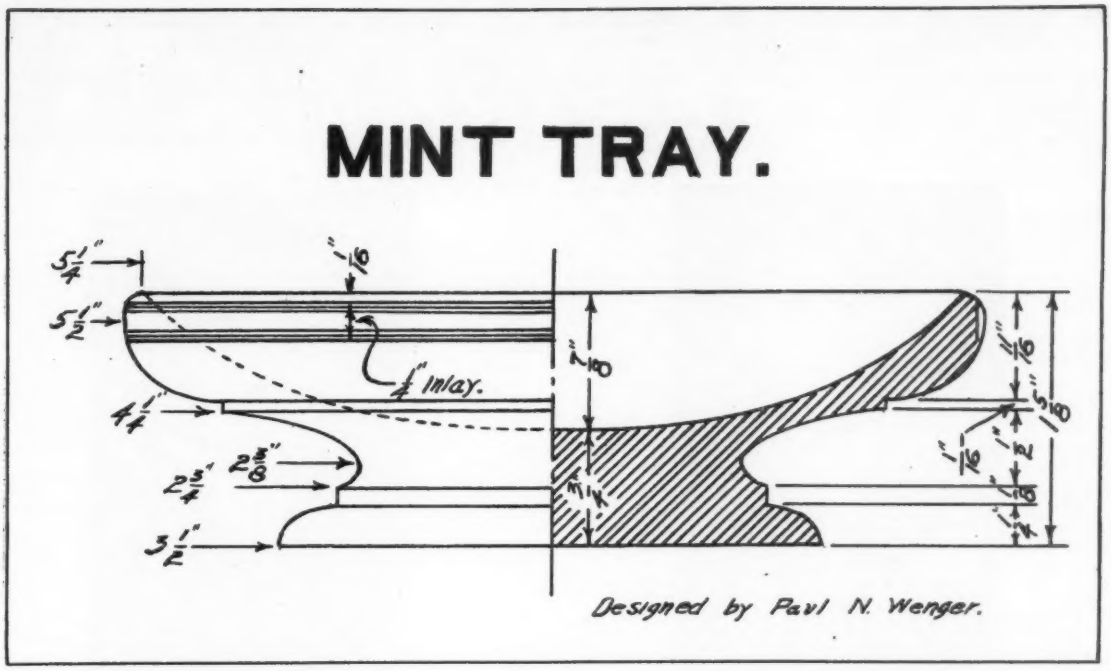


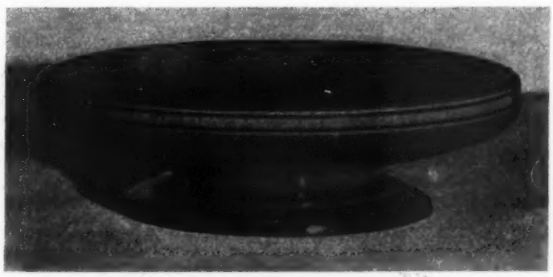
FIREPLACE SCREEN scale 1"/8 = 1"


Elevation
Width greater than height
The cylinder
Tangent
Major axis of ellipse is at right angles to center line
Ends too flat
The ellipse
Ends too pointed
Major axis
Minor axis
The ellipse appears roundest when viewed below the eye-level or as it changes from a horizontal to a vertical position
Above eye level
Below eye level
Right angles
Right angles
Right angles
Method of determining major axis of ellipse


The geometric basis
The short axis must be at right angles with the long axis
Two common mistakes
Tangent
THE CIRCLE IN PERSPECTIVE APPLIED TO EVERYDAY OBJECTS.

SUGGESTED PROBLEMS IN SKETCHING, BASED ON THE CIRCLE.
By Alfred G. Pelikan, Milwaukee, Wisconsin





A MINT TRAY

Paul N. Wenger, Supervisor Manual Arts, Greenwich, Connecticut

This tray is an interesting problem in faceplate turning. It is best made of a high-grade cabinet wood. The inlay border may be omitted if so desired. However, since the inlay improves the appearance of the project immensely, it should be added whenever it is not beyond the ability of the boy.

The project may be made from a single piece or from glued-up stock. As the amount of material is rather small, a wood of good quality should be selected.

HOW INDUSTRY CUTS IRON

While practically everyone is familiar with the process of oxyacetylene cutting and the use of the cutting blowpipe, it is not generally recognized that the oxyacetylene process may be used to cut iron and steel of almost unlimited thickness. In the past, the cutting of large masses was a problem in many plants. This problem has now been successfully solved with the use of the oxygen lance in conjunction with the oxyacetylene cutting blowpipe.

The method of cutting a frozen ladle of steel 8 ft. high and weighing 65 tons is shown in the accompanying illustration. A delay in pouring had brought about a freezing of the mass in the ladle, and its reclamation presented a problem to the management until they were shown that it could be handled by the oxyacetylene process.

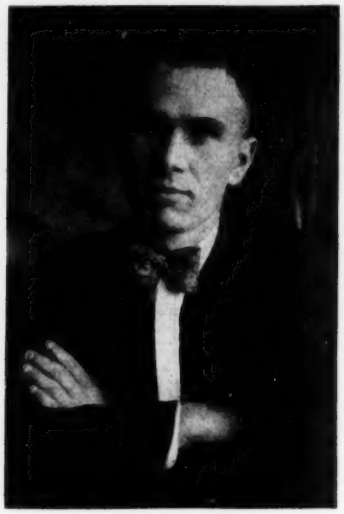
The first step was to break away the ladle and its refractory lining to expose the solid mass of steel. An oxygen lance was made and connected to a source of oxygen. The pressure was controlled by a regulator on the manifold, and a length of oxygen hose was run from the regulator to the steel pipe forming the lance.

In operating the blowpipe, an operator was placed at each side of the steel mass. The oxygen lance was then brought into play to carry the cutting down to the bottom, and the blowpipe was run along the line of the cut on the top surface. The lance was then raised to pick up the blowpipe cut and to carry it to the bottom. This method of operation was continued until the cut was completed. The two pieces obtained were then cut into smaller pieces of a size which could be placed in the furnace and remelted.

THE OXYGEN LANCE AT WORK

MR. REYNOLDS SUCCEEDS MR. SMITH AS DIRECTOR OF EL PASO VOCATIONAL SCHOOL

Mr. James T. Reynolds, who succeeds Mr. Victor J. Smith as director of the Vocational School at El Paso, Texas, is well prepared from the standpoint of both training and experience for his new position.



JAMES T. REYNOLDS,
Director Vocational School,
El Paso, Texas

Mr. Reynolds has attended the United States Motor Transport School, finished two years of college work at the Sul Ross State Teachers' College, and taken some electrical engineering at the Texas Agricultural and Mechanical College. Subsequently, he received his degree, in 1925, from the West Texas Teachers' College.

Mr. Reynolds has also spent some years at practical carpentry. He taught one year in the Alpine High School,

VICTOR J. SMITH,
Director Industrial Education,
Sul Ross Teachers' College,
Alpine, Texas

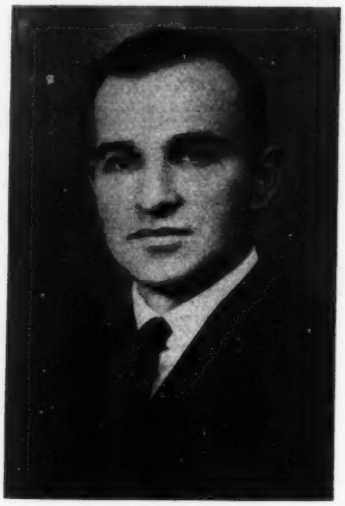
but resigned to become a manual-training instructor at El Paso. During the past year he taught the related subjects in the El Paso Vocational School.

Mr. Victor J. Smith resigned from the position now taken over by Mr. Reynolds to become director of the department of industrial education at the Sul Ross Teachers' College, Alpine, Texas.

MR. PATLOW IS SUCCEEDED BY MR. ALBERTY

Mr. John R. Patlow, of Lincoln, Nebr., has been elected director of industrial education at Pontiac, Mich., to succeed R. P. Tenny.

Mr. Patlow is a graduate of Stout Institute and holds a



JOHN R. PATLOW,
Director Industrial Education,
Pontiac, Michigan

B.S. degree in industrial education. He possesses a wide experience as a shop teacher and supervisor of industrial education, and has acted as secretary of the Nebraska Vocational Guidance Association.

Mr. L. H. Alberty, of Lincoln, Nebr., who succeeds Mr. Patlow as supervisor of industrial arts, was for three years head of the industrial-arts department of the Lincoln High School.

L. H. ALBERTY,
Supervisor Industrial Arts,
Lincoln, Nebraska

Mr. Alberty is a graduate of the State Teachers College at Pittsburg, Kans., and of the Sweeney Automotive School at Kansas City, and holds a B.S. degree in education given by the former institution. He held the position of manual-training instructor at Halstead and Winfield, Kans., before going to Lincoln to accept the position in the high school.

THE AMERICAN VOCATIONAL ASSOCIATION MEETING

The program committee of the American Vocational Association is reporting that it is rapidly completing its plans for the next annual meeting which will be held December 5–7, at New Orleans, La.

The sectional meetings for trade and industrial education and for the industrial arts have been scheduled for Friday and Saturday morning. The general meetings will be held on Wednesday and Thursday evenings.

The program for trade and industrial education on Thursday morning will center around examples of vocational training for the industry. This part of the program has been planned to present a number of outstanding examples of vocational training, which are carried out by the industry in cooperation with the public schools. On Thursday afternoon, the program will deal largely with plant training.

Special provision has been made for a section on the evening industrial school, with Mr. J. O. Mahoney of Dallas, Mr. R. W. Selvidge of Columbia, Mo., Mr. L. W. Fox of San Antonio, Tex., and Mr. H. G. Martin of New Orleans, as speakers.

There will be a special session devoted to apprenticeship on Friday morning, with Mr. C. G. Via, Mr. Henry Roesch, and Mr. L. E. Brigham as speakers. Part-time cooperative education will be on the program with Mr. O. D. Adams of Salem, Oreg., Mr. Victor Smith of Alpine, Tex., Mr. P. L. Cressman of Harrisburg, Pa., Mr. R. L. Small of Boston, Mass., and Mr. M. Carrasco, of El Paso, Tex., as the speakers.

On Saturday morning there will be a section devoted to industrial education in the states having no large industrial centers. Among the speakers will be Mr. W. F. Bond of Jackson, Miss., Mr. E. F. Riley of Wahpeton, N. Dak., Miss Marcia Gibbs of Jackson, Miss., and Mr. George P. Hambrecht of Madison, Wis.

The meeting for the industrial-arts group has not been completed, but the committee is working in cooperation with a number of the more prominent cities of the south. The meeting which will be in charge of Mr. William T. Bawden, will give considerable attention to the industrial-arts program in cities of less than 25,000 population. One section will deal with the advantages and disadvantages of the general shop. On Friday morning the topic for discussion will be preservice and in-service training for industrial-arts teachers. There will also be some time given to a report of the committee on standards in industrial arts.

The teacher-training program will take up in-service training of evening-school teachers, training industrial teachers by correspondence, and testing of candidates for teacher-training classes. Among the speakers are Mr. Hartman Dignowity, Austin, Tex., Mr. George S. Sanders of Phoenix, Ariz., Dr. Walter B. Jones of Pittsburgh, Pa., and Mr. A. S. Hurrell of State College, Pa.

On Friday morning the program will be devoted to the training of teachers, which will be in charge of Dr. Gerald D. Whitney of the University of Pittsburgh. Mr. C. H. Wilson of the University of Tennessee, will discuss "The Survey as a Means of Training Teachers"; Mr. G. E. Myers of the University of Michigan will take up "The Need of Standardizing Teacher-Training Courses"; a third subject will be "The Training of Vocational Teachers at the Colorado State College," which will be discussed by a speaker to be chosen.

On Saturday morning the program will be devoted to a round-table conference, in charge of Mr. R. H. Rodgers of the Milwaukee Vocational School. The group will take up such problems as the function of a committee of the association in the field of teacher training, problems in the field of teacher training, and methods of studying selected problems.

The general program will take up some of the important problems of vocational education as viewed from the standpoint of the labor organizations.

THE TULSA MANUAL-ARTS CLUB

The first monthly meeting of the Tulsa Manual-Arts Club was held in the auditorium of the Y. W. C. A., on Friday evening, September 20.

The membership of the club includes the manual-arts teachers, the part-time, and coordinating instructors. Mr. F. C. McCullough, head of the department of manual arts, Central High School, is president of the club and acted as chairman for the program. After the usual six o'clock dinner, Mr. McCullough introduced a group of six boys from the music department of the Central High School, who played in a six-part ensemble selections typical of the old-time small brass-band music.

Mr. C. E. Gumm, also of the Central High-School faculty, was introduced as the perennial toastmaster of the club. He gave a review of the curricular and extra-curricular activities of the manual-arts-club members during the summer of 1929. In his usual witty way, Mr. Gumm introduced several members of the club who told of their summer experiences. Several attended summer schools at various places ranging from New York to Oregon. Others spent the summer working at the trade represented by the courses which they teach in the school system.

A feature of the evening's program, was the reading of the 'Last Will and Testament' of Mr. Charles Washburn, who has taught the mechanical-drawing and machine-design classes at Central High School for ten years. Mr. Washburn, a mechanical engineer of considerable experience, is leaving the classroom for a position in the engineering department of the Mid-Continent Petroleum Corporation. Always mindful of his duties and obligations toward his classes, Mr. Washburn read a clever document purporting to be his last will and testament in which he allotted his various charges and duties at Central High School to his coworkers. Although Mr. Washburn is leaving the active teaching work, he has been unanimously elected to a permanent associate membership.

A canvass conducted at the meeting showed that Messrs. Jerry Walker, Charles Fleischman, and Raymond Johnson spent their vacation traveling through the West, and that the following attended summer school: Mr. R. V. Lulow at Ames, Iowa; Messrs. F. C. McCullough and H. F. Miller at Columbia, Mo.; Messrs. E. M. Hale and R. A. Armstrong at Pittsburg, Kans.; Mr. B. W. Hargis at Stillwater, Okla.; and Messrs. O. B. Badger, Earl McMahon, and J. W. Bollinger at Fort Collins, Colo.

The following are new members of the club: Mr. C. L. Hill, formerly of Caney, Kans., who will teach woodworking and mechanical drawing at Eugene Field School; Mr. F. C. Gerhart, who formerly taught printing at Logansport, Ind., and who will teach printing at the Central High School; and Mr. Earl McMahon, formerly at Ponca City, Okla., who will teach metal work at the Vocational School.

The officers of the club, Mr. F. C. McCullough, Central High School, president, Mr. J. W. Bollinger, Roosevelt Junior High School, vice-president, and Mr. Hugh E. Miller, Central High School, secretary-treasurer, have planned a series of interesting meetings, to be held monthly throughout the fall and winter. The October meeting will be held in conjunction with the Northeastern Oklahoma state teachers' meeting, which meets in Tulsa, October, 24, 25, and 26.—*Jerry Walker.*

WESTERN ARTS MEETING

The Western Arts Association will hold its 1930 meeting May 6 to 9, at Minneapolis, Minn. The headquarters for the meeting will be in the Curtiss and Leamington hotels.

The program committee is hard at work completing arrangements for a program which will be of interest to teachers of art, industrial arts, and vocational education.

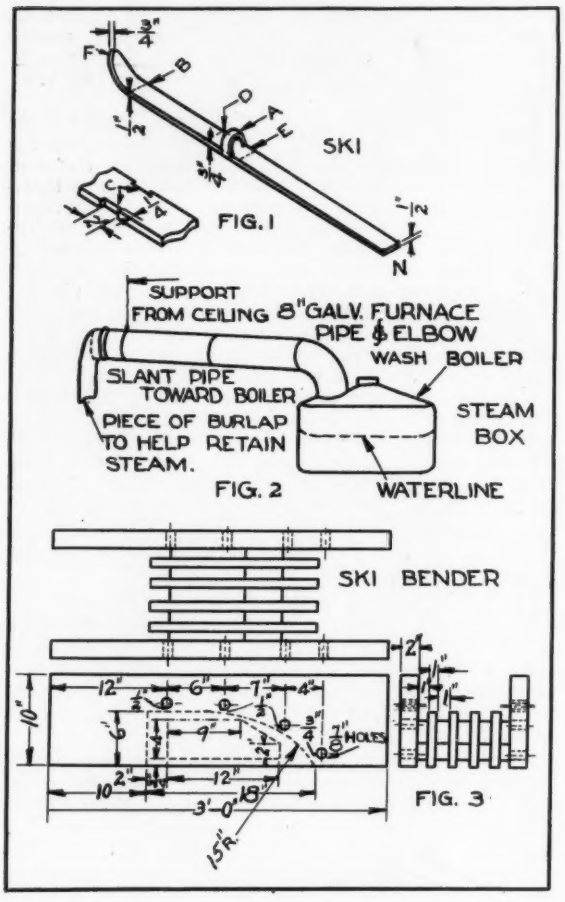
Information concerning the meeting or the exhibits may be obtained from the secretary, Mr. Harry E. Wood, director of vocational education in the Indianapolis schools.

NOW, ARE THERE ANY QUESTIONS?

Skis

894. Q.: Please send me any information dealing with the making of skis.—*S. S.*

A.: There are several articles on skis which have appeared in the past in the INDUSTRIAL-ARTS MAGAZINE. You will find one of them on page 112 of the March, 1918, issue, another on page 163 of the April, 1918, issue, still another on page 32 of the January, 1925, issue. On the same page as the last-mentioned issue, there is also an article on bending skis. The information which we are giving herewith has been taken out of the two last-mentioned articles. One of these is by Charles W. Frost and the other by Frank W. Dejmek.



White ash, birch, or spruce, are good woods to use for skis, but pine or cypress may also be used. Use only straight-grained pieces that can be easily bent. Skis are made from 4 to 9 ft. long, depending upon the weight of the bearer. A boy weighing 100 lb. would require skis about 5 ft. in length; 120 lb., 6 or 7 ft. in length. A man weighing 150 lb. or over should have skis 8 or 9 ft. long. The width of the ski should be made a trifle wider than the sole of the shoes which are to be used with the skis.

To make a pair of skis, proceed as follows:

1. Plane two pieces of wood of the required width and length. (See Fig. 1.)
2. Draw center line E.
3. Lay out line N, ½ in. from the bottom and square across.
4. Draw line from E to N on each of the side edges, and plane the faces down to these lines.
5. Lay out line D, 6 in. toward the front from center line E.
6. Lay out line B, 12 in. from the opposite end on each of the pieces, and square the line down on each side.
7. Lay out a point ½ in. from the bottom on each side, and draw lines from these points to D.
8. Plane the faces down to these lines.
9. Draw lines from end F to B on each of the edges.
10. Plane the faces down to these lines.
11. Cut out the notches at C.
12. Shape the ends F.

To bend the front end of the skis, steaming must be resorted to. Figure 2 shows a homemade steam box which may be used. Figure 3 shows the details of the ski bender. At A, B, C, and D, are holes bored through both side pieces large enough to admit a piece of ½-in. gas pipe. In bending the skis, the two skis are placed with their points at X, Figure 3. Then the first piece of gas pipe is stuck through above the skis to hold them in place. Then the skis are bent backward and the next piece of gas pipe is introduced at B. Further bending of the skis permits the next piece of gas pipe to be introduced at C and finally the one at D is put into place holding the skis in place on the forms. Small wedges may be driven between the pipes and the skis to hold the latter firmly against the forms. After allowing the skis to remain in the benders for several days, they are removed and the tops and sides may then be varnished. The bottoms should be oiled or waxed, or filled with tallow which should be rubbed in hot.

Refinishing Antiques

895. Q.: Kindly give me information as to finishing antiques in walnut, mahogany, and maple.—*C. L. H.*

A.: Before doing any refinishing, a high-grade varnish remover and No. 2 steel wool should be used for removing the old varnish. The article should be finally washed with rags saturated with denatured alcohol. After the piece is thoroughly dry, it should be sanded clean and free of scratches.

For a walnut finish, apply water stain of a 3 or 4 oz. per gallon solution. After this has dried, sand with split 6/0 sandpaper. If you wish to high-light portions of it, saturate a small pad of clean cotton cloth with the stain and rub up those portions which are to be darker. For a varnish finish follow with a first coat of orange shellac reduced 3 parts of alcohol to 1 part of shellac. After this has dried hard, sand off with a split 6/0 finishing paper. Dust off and follow with a clear coat of varnish. Allow this to dry for about three days. Again sand with split 6/0 paper. Dust off and apply a final clear coat of varnish. After this has dried hard, rub down with crude oil and FFF pumice stone.

For the mahogany finish, sponge the wood lightly with warm water. Dry and resand. Dust off and apply a coat of antique mahogany walnut stain and let dry over night. Then apply a coat of orange shellac reduced with at least 3 volumes of denatured alcohol. After this has dried hard, sand with a split 6/0 sandpaper. Dust off and fill with a rich brown silex filler. Clean this off well and let the filler dry 48 hours. Then give it a final coat of clear varnish which is to be allowed 3 days for drying. Sand off with split 6/0 sandpaper and apply a second coat of the varnish. Again sand with 6/0 sandpaper, and apply a third coat of varnish which should be allowed to dry for a week, after which it may be rubbed with FFF pumice stone and water. For the final rub, dip the pad in a mixture of crude oil and water.

For the maple finish, apply a coat of diluted water stain of so-called amber maple. After this is dry, apply a thin coat of the orange shellac described in the foregoing. After the shellac has dried sand clean with 6/0 paper, after which another coat of shellac may be applied and then as many coats of varnish as desired. The last coat of varnish should be rubbed down with FFF pumice stone, crude oil, and a rubbing felt.

Two Bit Braces for the School Shop

The two Stanley Bit Braces illustrated are particularly recommended for school shop use. They are well constructed, strong, and easily operated. Their satisfactory performance in many school shops is your best guarantee of long service and economy.

No. 810 — 10″ sweep

This Bit Brace is constructed with a new, sensitive, and easy operating concealed ratchet mechanism which practically eliminates back turning when starting to ratchet with small bits.

The cocobola head is metal clad, ball bearing and bronze bushed. Cocobola handle. The chuck is ball bearing with forged jaws and a special type of jaw spring. It will hold round shank drills from ⅛″ to ½″, Morse taper shanks, large square tapers such as furnished on expansive bits, and all sizes of taper shanks of auger bits.

It is nickel plated over a copper base and sturdily built for the heaviest jobs.

No. 903 — 8″ sweep

This Bit Brace has the well known Box ratchet construction and a chuck with forged jaws that will hold all sizes of taper shanks of auger bits as well as the large shanks of expansive bits.

The cocobola head is semi-clad, ball bearing and bronze bushed. Cocobola handle.

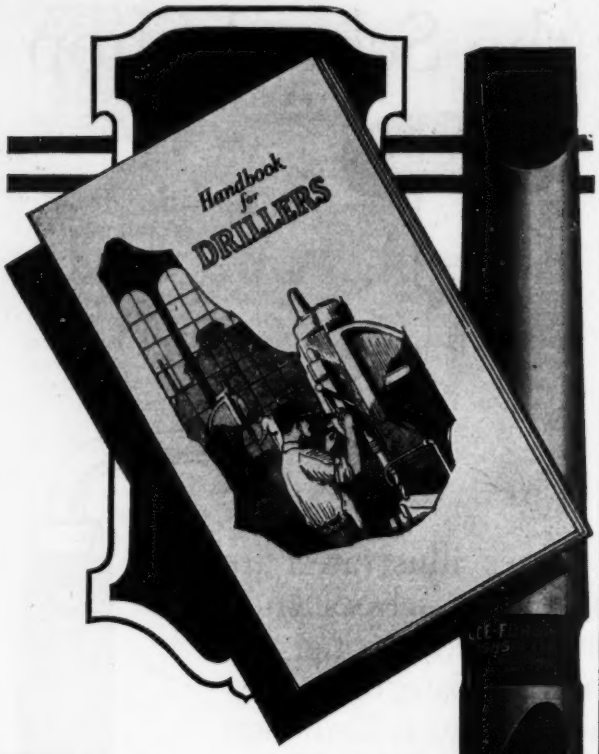
It is a general all around Bit Brace of first quality for almost every boring job.

Copy of Stanley Tool Catalog No. 34 with special School Index will be sent upon request

THE STANLEY RULE & LEVEL PLANT
Educational Department
New Britain, Conn.

STANLEY TOOLS

Stanley Equipment is Standard Equipment



Points on Drill Grinding

Putting a proper point on the business end of a twist drill doesn't sound hard—but the fact is that 11 pages, or practically 25% of the "Handbook for Drillers," are devoted exclusively to this all-important thing. In reality pointing a twist drill is a delicate piece of work calling for great skill, and much advance knowledge.

If you would like copies of the Handbook for the use of students in machine shop practice, we shall be glad to send them to you, without charge, in any reasonable quantities.

The CLEVELAND TWIST DRILL COMPANY CLEVELAND NEW YORK-CHICAGO-LONDON SAN FRANCISCO

TRADE MARK REG. U. S. PAT. OFF. AND FOREIGN COUNTRIES

NEWS AND NOTES

Open New Building in Cincinnati

The new building of the automotive trades school at Cincinnati, Ohio, was opened the first week in September, with an initial enrollment of 376 students. The new school year was begun with several additions to the school faculty.

Vocational School Addition Nears Cmpletion

The new addition to the vocational school at LaCrosse, Wis., will be completed shortly at a cost of $50,000.

New Course in Paper and Pulp Work

A new course in paper and pulp work has been introduced in the vocational school at Wausau, Wis. Mr. G. J. Brabender, of the University of Wisconsin, has been appointed as an itinerant instructor.

Vocational Trade School at Wichita, Kans.

The new trade school at Wichita, Kans., is offering courses in printing, machine-shop practice, electricity, mechanical and architectural drawing. The school opened with an initial enrollment of 500 students.

Trade and Industrial Courses Offered

A series of trade and industrial courses is offered in the night school of the Milwaukee Vocational School for the benefit of those interested in the practical and technical phases of their work. The courses, which require five years for their completion, are intended to prepare students for advanced positions as foremen, superintendents, and executives.

Propose Agricultural Farm Shop

An agricultural farm shop has been erected for the use of students in the Jasper High School at Jasper, Mo.

New Courses at Boys' Vocational School

New courses in automotive mechanics, carpentry, mechanical drawing, electrical work, and plumbing have been introduced in the Essex County Boys' Vocational School at Newark, N. J.

Erect Storage House at Alton, Illinois

A storage building for the portable bleachers and athletic equipment is to be erected at Alton, Ill., by the high-school manual-training class, under the direction of Mr. G. C. Ritcher. The erection of the building affords a practical project in carpentry to the manual-training pupils.

New Trade School at Owensboro, Kentucky

The new trade school opened at Owensboro, Ky., with a capacity enrollment of 45 students. The course includes automotive mechanics, electricity, and English.

New Vocational Department at Midland, Pa.

The new addition for the Lincoln High School at Midland, Pa., contains an entire wing devoted to the various shops of the vocational department. Included in the department are a machine shop, an electrical and radio shop, a metal shop, a foundry shop, a woodworking shop, and a mechanical-drawing room.

New Vocational School at Houston, Texas

A two-story vocational school is being erected at Houston, Tex. The building, which provides accommodations for 300 students, will be erected at a cost of $35,000. It contains five classrooms and four large laboratories.

Smith-Hughes Vocational Work at Manitowoc, Wis.

Under the provisions of the Smith-Hughes law, the vocational school board of Manitowoc, Wis., will receive federal aid for vocational evening classes conducted in cooperation with the state board of vocational education.

In the trades and industry group, it is planned to offer machine shop work, printing, automotive mechanics, carpentry, sheetmetal work, painting and decorating, plumbing, electricity, bricklaying, concrete work, and drafting for specific trades. The classwork will be organized in units of the trade, to cover ten weeks' work. Students over 16 years old are eligible to the classes.

Urge Trade Classes for Girls in New York City

Facing an imperative need for industrial training for overage and backward girls, the board of education of New York

(Continued on Page 28a)

11,000 Feet Per Minute

and Guaranteed to Stand It!

LIMITATIONS ONLY

ARE THE SAW BLADE AND THE WORK

Except at cut, Entire Saw Blade is Fully Enclosed—

Safe To Operate

Y-30—Y-36

THINK OF THE SAW CUTS AT THIS SPEED

All those interested in manual training equipment should have our new and most complete vocational woodworking machinery catalogue — No. 25-S — which will be ready for distribution about December 1st, 1929. No obligation. Sent cheerfully.

Watch these new Yates-American band saws—the Y-30 and Y-36. You will see more schools installing them than any other make machine of similar type.

And there are reasons.

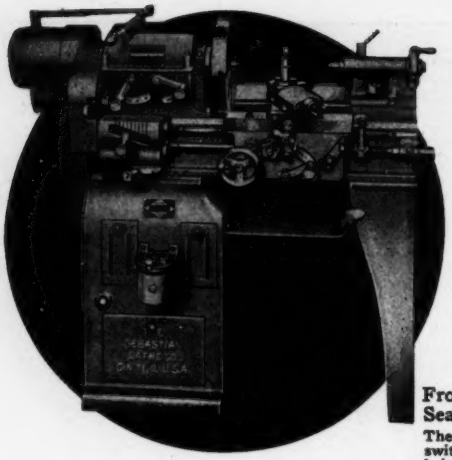
First, the Y series band saw is safely operated. Every portion of the saw blade is enclosed with the exception of the small amount at the cut. It is so ruggedly constructed that the only limitations are the saw blade and the work. There are Dodge Timken Roller Bearings, brake for quickly stopping the wheels, tilting table, etc. The Y-30 has 30" wheels and the Y-36 36" wheels. Full information on this outstanding machine gladly given.

"Train Your Students Today on Machines They Will Use Tomorrow."

YATES-AMERICAN MACHINE COMPANY

Vocational Division

BELOIT, WIS.



The 11-inch Gold Seal Heavy Duty Lathe was built to fill the need for a small, high speed lathe capable of production work and at the same time incorporating all the features necessary for extremely close precision work.

a safe lathe! The SEBASTIAN Gold Seal

From the standpoint of personal safety for the operator, the 11-inch Gold Seal heavy duty lathe is unsurpassed.

The motor is built in the leg beneath the headstock and is controlled through a convenient switch within easy reach of the operator. There are no open belts or exposed pulleys, drive being accomplished through a fully enclosed, safe, motor chain. All speed changes are obtained through two levers at the front of the headstock—no removal or insertion of separate gears is necessary and it is impossible to jam the gears by locking in two speeds simultaneously.

Starting and stopping of the lathe itself is independent of motor control and is accomplished by a friction drive controlled by a lever within easy reach. All feeds and threads are controlled by two levers on the quick change box and one sliding on the quick change tumbler shaft. It is absolutely impossible to engage both lead screw and feed shaft at the same time.

The lathe itself is carefully protected against damage due to carelessness or overload. It is the heaviest machine of its size built and in addition it is provided with a safety shear pin at the end of the quick change box. This pin will shear under dangerous overload before any damage can be done to the lathe itself.

Safety should be a dominating feature of every school machine, and we honestly believe there is no safer lathe than the SEBASTIAN Gold Seal.

Gold Seal SEBASTIAN LATHES GUARANTEED CORRECT

THE SEBASTIAN LATHE CO.

CINCINNATI, OHIO

New York Office—Room 372—50 Church Street

(Continued from Page 26a)

City has authorized the establishment of an independent school in vocational or trade subjects for the instruction of over-age and backward girls in the regular grades of the elementary schools. These pupils are largely over-age, and in some cases ungraded, who do not easily fit into the present course of study, and who are liable to leave school before the eighth year. Such pupils, if sent to the high schools, are unable to do the regular work and they early withdraw from school.

The new school has been established in Public School 136, of the borough of Manhattan, because there are a large number of girls in the neighborhood who are readily adapted for vocational or trade work. The work offered in the school will provide opportunities for instruction in trade subjects so that these pupils will have the preparatory trade training when they leave school to go to work.

Brooklyn Needs More Trade Schools

The name of the Boys' Vocational School of Brooklyn, New York, has been changed to the Brooklyn Industrial High School.

Plans are being completed for the enlargement of the Industrial High School to accommodate 1,400 more students. The present enrollment of the school is 850 and the institution is forced by lack of accommodations to refuse admission to 600 students each year.

Vocational Courses for the Blind and Deaf

A course in brushmaking has been introduced in the Ohio State School for the Blind at Columbus. Pupils in the school are given training in chair caning, brushmaking, basket weaving, science, sewing, knitting, and crocheting.

In the school for the deaf, a course in upholstery has been added. Boys in the school are given training in cabinetmaking, printing, tailoring, shoe repairing, painting, and sign painting, while the girls are given sewing, crocheting, needlework, science, millinery, and baking.

Vocational Guidance Work at Bluefield, W. Va.

The McComas High School at Bluefield, W. Va., has assigned one period per week to student vocational guidance. Under the plan, each home-room division will meet with the sponsor for study of the vocations in the group. It is planned to have selected individuals speak at assembly periods on their vocations.

Cleveland Pupils Select 88 Vocations

A total of 88 vocational lines were recently listed by the high-school students of Cleveland, Ohio, following a request for the selection of the vocations which appealed to them. Fifty-nine of the 1,006 boys listed aviation as their preferred career, while 66 boys named aeronautical engineering. Medicine, law, engineering, and business were selected by the majority of the students, while 95 of them were unable to make a selection.

It is planned to have representatives of the various professions address the students at stated times during the school year.

Woodworking Shop Opened at L'Anse, Mich.

A woodworking shop was opened in the new manual-arts department of the high school at L'Anse, Mich.

Boys Complete House at Highland Park, Ill.

The boys of the industrial-arts department of the Deerfield-Shields Township High School, Highland Park, Ill., have completed a house erected by the members of the department.

New Manual-Arts Building at Galion, Ohio.

The board of education will erect a manual-arts building during the present summer, to house the vocational, machine shop, and cabinetmaking departments. It will be erected from plans prepared by Althouse & Jones, architects, and will be located on the senior high school grounds.

Propose Vocational School at San Antonio, Tex.

A recent survey of the schools of San Antonio, Tex., by the staff of the state university, recommends a $2,000,000 bond issue for the remodeling and rebuilding of the Main Avenue High School for use as a part-time, day-trade, and evening vocational school. The bond issue would also provide additional shops for the junior high schools.

(Continued on Page 31a)

(Continued from Page 28a)

SALARIES PAID DIRECTORS OF VOCATIONAL EDUCATION, MANUAL TRAINING, AND HOME ECONOMICS

The accompanying table, issued by the research division of the National Education Association, shows the salaries paid school administrative and supervisory officers, for 1928–29, in 67 cities over 100,000 in population.

Cities	*Directors of Vocational Education*	*Directors of Manual Training*	*Directors of Home Economics*
Alabama			
Birmingham	$3,900	$3,500	$3,500
California			
Los Angeles	5,300	4,000	4,000
	4,800	3,200	5,200
	4,000		
	3,700		
Oakland	4,580		
	4,500		3,720
	3,650		
San Francisco		4,020	3,180
Colorado			
Denver		4,250	4,250
	5,800		
	2,600		
Connecticut			
Bridgeport		3,000	
Hartford	3,250	3,000	2,400
New Haven		2,700	
Delaware			
Wilmington			2,200
District of Columbia			
		4,400	3,500
		3,500	
Georgia			
Atlanta	3,720		
Illinois			
Chicago	5,600	5,500	5,000
Indiana			
Indianapolis	5,000		3,200
	3,000		
Iowa			
Des Moines		3,850	2,810
Kansas			
Kansas City	4,000	2,508	
Kentucky			
Louisville	4,600	2,800	
	2,500		
	2,000		
Louisiana			
New Orleans	2,500	3,400	2,700
Maryland			
Baltimore	5,000	4,200	3,600
	2,750		
	2,000		
	1,800		
Massachusetts			
Boston	4,200	5,040	4,200
		4,800	3,480
		4,176	3,160
		4,080	
Cambridge		3,600	2,500
Fall River	3,800	2,800	2,500
Lowel	2,300	2,450	
Springfield			3,400
New Bedford		2,750	1,700
		1,900	
Worcester		3,500	2,625
Michigan			
Detroit	6,600		4,500
	5,400		
	4,500		
	3,840		
	2,800		
Grand Rapids	5,500	4,000	
	4,000	2,900	
	3,100		

(Continued on Page 32a)

Correct shop practices begin with correct *tools*

THE grip, the feel, the performance of a tool gives confidence to the inexpert hands of your boys.

Give them Plumb Hammers, the choice of good workmen everywhere.

For a Plumb has a full face for accurate nail driving. The weight is centered in the head to give the tool a natural fall. The sharp nipper claws will bite and pull the slimmest headless nail. The special claw curve gives greater leverage to help draw stubborn nails.

And a Plumb has balance—that "something" in the feel of a hammer that makes it seem part of your arm.

Made of finest Plumb Steel, tempered scientifically with modern electric equipment. Fitted with selected strength tested hickory handles.

Specify Plumb, with the Red Handle and Black Head, for long service in your school shop.

Fayette R. Plumb, Inc.
Philadelphia, U. S. A.

PLUMB
DOUBLE LIFE
Hammers Hatchets
Files Sledges Axes

A safety feature found only in Plumb Tools

Plumb solved the loose handle problem after years of experiment. Not by developing a wedge to keep handles tight. No wedge does that, because wood will shrink. But Plumb gives you the patented Plumb Screw Wedge which enables you to retighten the head instantly, just by a turn of the screw. Every school shop should have this safety feature in its hammers.

The old way 60 minutes
The new way 1 minute!
A smoother job, and more accurate
With a Campbell Nibbling Machine you can cut any internal or external shape, so perfect and close to template or scribed line that very little finishing is needed.
Campbell Machines are made in six sizes to take stock up to 3/8", with various throat sizes to handle different types of work.
CAMPBELL
NIBBLING MACHINE
Ask us for full information—drop a card
to ANDREW C. CAMPBELL, Inc.
Bridgeport, Connecticut

(Continued from Page 31a)

Minnesota			
Minneapolis		3,500	3,475
			2,825
			2,300
St. Paul		2,200	2,750
	3,850		
Missouri			
Kansas City	4,500	2,700	3,000
St. Louis	5,000	4,000	3,200
New Jersey			
Camden		2,900	
Jersey City	6,000	5,000	
Newark		4,500	4,500
			3,800
			3,200
Paterson		6,700	3,900
Trenton	5,250	4,500	3,650
		3,800	
New York			
Albany	3,700		
	3,000		
	2,500		
Buffalo	5,000	3,500	3,500
		3,100	3,100
New York	8,500	5,000	6,500
	5,404		4,800
	4,707		3,900
	4,100		3,600
	3,900		
Rochester		4,500	4,200
			3,200
Syracuse	4,250		
	3,500		
Ohio			
Akron		3,000	
Cincinnati	4,300	4,300	4,300
Cleveland	5,800	3,938	3,600
		3,900	2,565
		3,375	
Columbus	4,000	3,000	3,000
			2,625
Dayton	4,500	3,100	3,100
Toledo		4,675	3,520
Youngstown	4,500		3,000
Oregon			
Portland		2,900	2,900
Pennsylvania			
Philadelphia		5,500	5,500
			4,000
		1,800 to	1,800 to
		3,200	3,200
Pittsburgh	6,000	5,000	5,000
		4,000	
Reading		3,800	2,800
Scranton			2,400
			2,100
Rhode Island			
Providence		4,500	2,800
Texas			
Fort Worth		3,000	
Houston		3,600	3,400
San Antonio		4,150	2,800
Tennessee			
Nashville		2,160	2,160
Virginia			
Norfolk	3,650		2,200
Richmond		3,080	2,300
		2,100	1,849
		1,900	1,649
			1,549
Washington			
Seattle	2,860	2,760	2,580
Spokane		2,650	2,350
Wisconsin			
Milwaukee			4,400

Enlarge Automotive Department at Waterloo

The school board of Waterloo, Iowa, has begun work on an addition to the automotive department of the manual-training building. The work will be completed at a cost of $600.

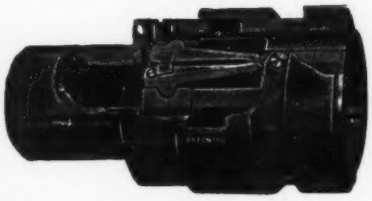
THE JOHNSON FRICTION CLUTCH

150 JOHNSON CLUTCHES

ARE DRIVING

WOOD-WORKING LATHES

In The STUYVESANT HIGH SCHOOL, NEW YORK CITY

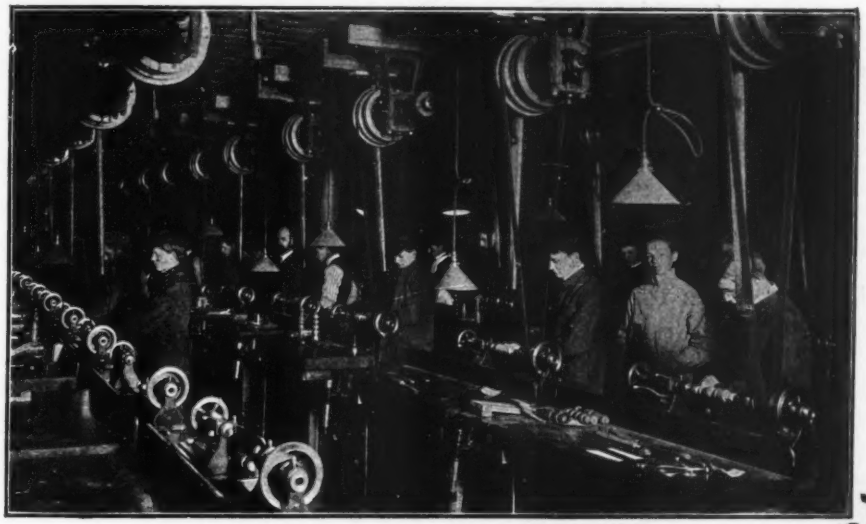


SINGLE CLUTCH SECTIONED
Single Clutches for line shaft drives where high speed is desired.

CONSTRUCTION

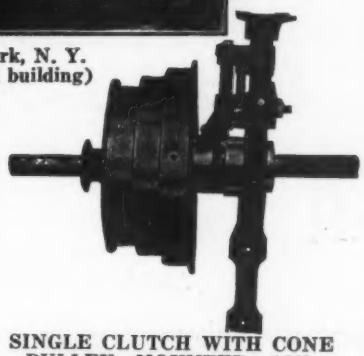
The sleeve carries a curve-shaped wedge which spreads the levers when sleeve is moved forward and the levers being fulcrumed in the ring, expand the ring inside the cup. The frictional contact drives the cup, on the hub of which can be mounted standard steel split pulley, cone pulley or solid iron pulley for shafting drives. For short center drive, sprocket is used. When installed on machinery a gear is more often mounted on hub.

JOHNSONS GIVE 15 to 20 YEARS SERVICE



Courtesy: The Stuyvesant High School, New York, N. Y.
(View of original installation of 30 Clutches in old building)

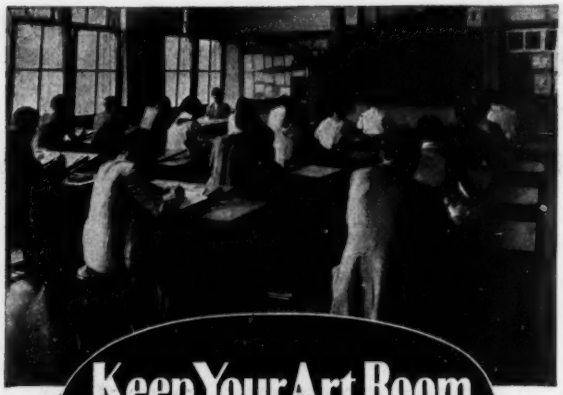
We supply the proper type of friction clutch on any sort of installation. Special models developed to meet conditions. Slow speed clutches carried in stock for immediate shipment. Made in nine sizes, to fit shafting from ¾ to 3 3/16 inch diameter.



SINGLE CLUTCH WITH CONE PULLEY MOUNTED AND STYLE "A" SHIFTER BRAKE MECHANISM.

WRITE FOR CATALOG "I. A. M.—11"

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.



Keep Your Art Room BUSY ALL DAY

Kewaunee Art Tables Will Accommodate Eight Classes

The art room or mechanical drawing room should be used every period of the day the same as other classrooms. To enable all day use of art and mechanical drawing rooms we have designed a table that provides individual accommodations for eight pupils.

This table is known as Art Table No. L-2028. It has four compartments that open to the front and four to the rear, holding drawing boards and other equipment. Rooms equipped with these tables can handle the greatest possible number of pupils at one time.

Art Table No. L-2028 For Eight

A Drawing Table for Six

We also make a Drawing Table to accommodate six students. It contains six separate compartments for individual use. It is one of our best sellers—it is very roomy and comfortable, with adjustable top.

Kewaunee Drawing Tables are all designed for the greatest compactness, comfort and convenience. They are firmly constructed to insure rigidity for long service under rough student usage.

Write for our complete book of illustrations showing the complete line of Art and Mechanical Drawing Tables.

Kewaunee Mfg. Co.
LABORATORY FURNITURE EXPERTS

Adrian Factory
C. G. CAMPBELL, Pres. and Gen. Mgr.
Designers and Manufacturers of Art and Mechanical Drawing Room Furniture for Schools and Colleges
1 End South Center St.,
ADRIAN, MICHIGAN

THE OWN DATA IN BRUCES SPECIFICATION ANNUAL 1929 EDITION

Kewaunee

NEW PUBLICATIONS

Everyday Arithmetic for Printers

By John E. Mansfield. Cloth, 112 pages, 5¼ by 7¾, illustrated. Price, $1.75. Published by the Mansfield Printing Co., Boston, Mass.

This little booklet contains much that is of extreme interest to the printer. Some may object to having a chapter on square root in a printer's arithmetic, but taken all in all, it is a compact little volume which will be found very handy by the teacher of printing in high schools, technical high schools, and part-time and full-time vocational schools.

Electricity Unit Course, Part I

For the Wisconsin city vocational schools. Paper. Price, 35 cents. Published by the McGraw-Hill Book Co., New York City.

The various projects in this unit course are arranged in the form of process sheets, and are somewhat limited in scope. A more complete range of work may be offered through the use of additional sheets, which will furnish the instructional material for all the processes involved in the projects contemplated. The course includes careful demonstrations for the use of individuals or small groups, and instruction sheets to be used under the direction of the teacher.

Paper Toys

By Anna Pauli. Paper, 60 pages, 9 by 12, illustrated. Price, $1.40. Published by The Manual Arts Press, Peoria, Ill.

This book will be welcomed by the primary art teacher. It is designed for toymaking in flat paper, for the first four grades. Full-size patterns are given for each toy and the cat-stair is introduced in each as one of the elements.

Dictionary of Technical Terms

By F. S. Crispin. Cloth, 287 pages, 4¼ by 6⅞, illustrated. Price, $1.25. Published by The Bruce Publishing Company, Milwaukee, Wis.

This little book will be found very helpful in shop classes because it is a dictionary which contains the definitions for words commonly used in the shop and on the job. Ordinarily, technical dictionaries are not available in the school shop, and this little handy book will satisfy all of the requirements. The terms are listed alphabetically in this book, and the application is shown after each word.

A.C. Radio Guide

By Kenneth A. Hathaway. Cloth, 120 pages, 5¾ by 8½. Published by the American Technical Society, Chicago, Ill.

A practical guide or reference book avoiding mathematics and technical discussion. Covers the application of alternating-current tubes for detection and amplification and such direct current and rectifier tubes as are used in modern so-called a.c. radio sets. Discusses a.c. set circuits in general and several of the more popular commercial a.c. sets in particular. Attention is also paid to the conversion of d.c. sets for a.c. operation. Special sections cover trouble shotting, short-wave reception, and speakers of both the armature and voice coil or "dynamic" types.

The book is of interest to the home radio builder and service man.

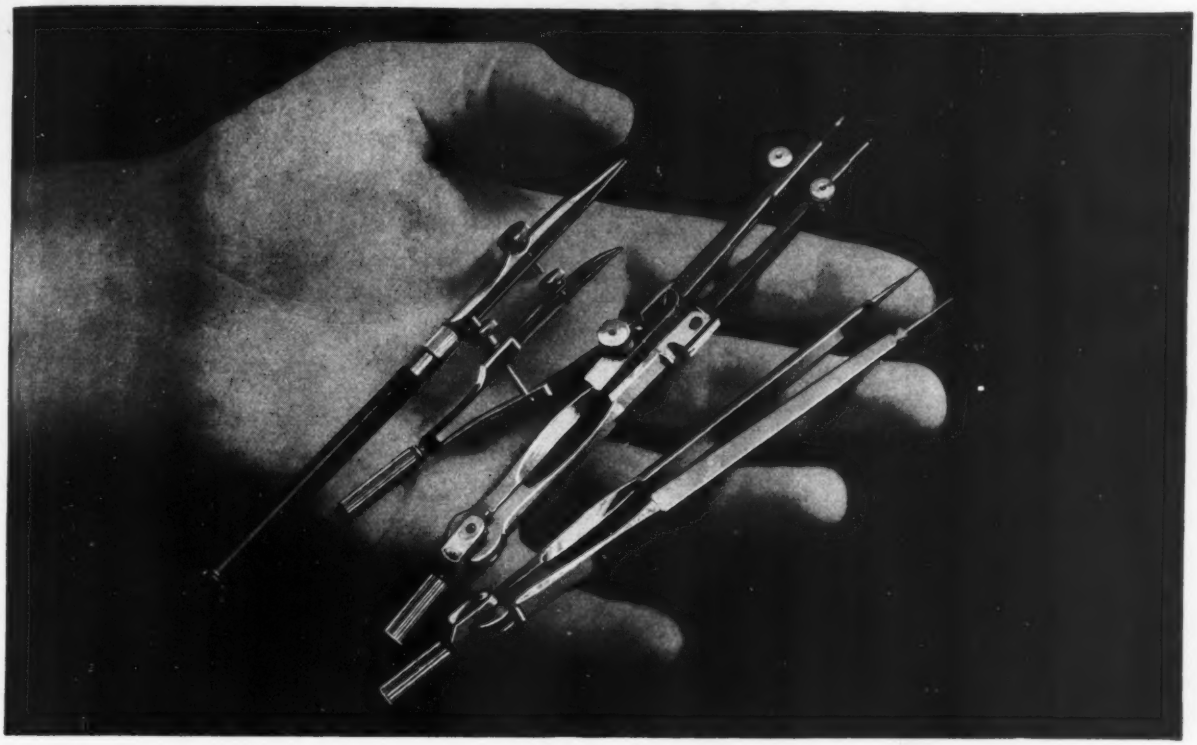
Notes for Mechanical Drawing

By F. E. Mathewson and J. L. Stewart. Revised edition. Cloth, 104 pages, 10¼ by 8¼, illustrated. Price, $1.48. Published by The Bruce Publishing Company, Milwaukee, Wis.

Many drafting instructors will welcome this old friend in the enlarged and revised format in which it now appears. All of the plates have been redrawn, and many new ones have been added. It may be safely prophesied that the book in its present form will enjoy even a greater popularity than it has in the past.

A Brief Course of Study in Elementary Printing

Prepared by Mr. L. E. Schmitz, and printed by the Central Junior High School at Saginaw, Mich. It contains a complete elementary course for young printers, together with typical job layouts, specifications, and directions for carrying out the work. The booklet also contains a brief bibliography on printing.



Whatever the price . . .
K & E instruments are maximum value

K & E drawing instruments for students are available in many grades. The highest priced, finest instruments made are K & E. There are K & E instruments for school use priced all the way down to the very lowest level at which even a reasonable degree of reliability can be produced.

Every grade of K & E instruments has in it the utmost that can be given by anybody at the price.

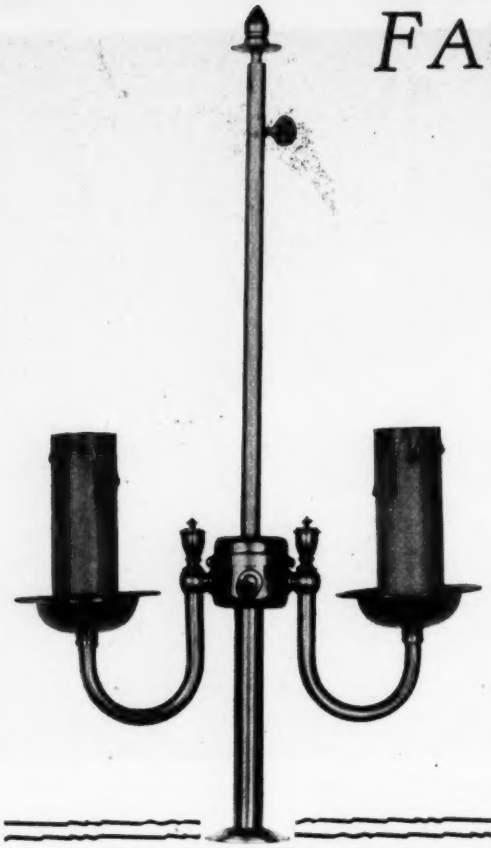
Naturally, the experience, equipment, skill and resources required to make the best regardless of price help produce the best at a given price . . . notably K & E Anvil Instruments, the choice of many schools and colleges year after year. There are other good K & E instruments for more money and for less. Have you the latest catalog of K & E drawing instruments, papers, drafting room furniture and supplies, slide rules, engineering instruments?

KEUFFEL & ESSER CO.

HOBOKEN, N. J.

NEW YORK CHICAGO ST. LOUIS SAN FRANCISCO MONTREAL

3736



FANCY FIXTURES

NEWEST type fixtures for Junior Lamps. Adjustable stem so that shade may be raised or lowered. Turn switch in center of stem. Fixture brass finish and candle casings old ivory. Wired complete.

Our line of "HARD-TO-GET" Materials represents fifteen years of careful selection of supplies for the Manual Arts Shop.

May we be of service to you?
Catalog mailed free upon request.

Thurston

Manual Training Supply Co.

Jobbers and Manufacturers of "Hard-to-Get" Materials

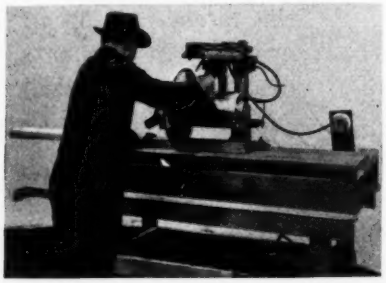
Anoka **Minnesota**

School Shop Equipment News

For the Supervisor and Teacher who desires to keep abreast with news of new Machinery, Tools, Supplies, etc.

ANNOUNCE NEW IMPROVED WOODWORKER

The De Walt Products Corporation, of Leola, Pa., has announced the marketing of the new Model D De Walt Wonder Woodworker. The manufacturers have produced an improved design, which makes possible the delivery of 50 per cent more power to the work, whether ripping, crosscutting, dadoing, mitering, or beveling. The machine is capable of ripping 4-in. fir at the rate of 50 lineal feet per minute, and may easily be changed from crosscutting to ripping, without turning off the power. The cutting tool is completely guarded in all positions.



A dial plate graduated in degrees and also provided with a pitch scale, enables the operator to make quick adjustments for angle or bevel cutting. The motor may be locked instantly and securely in any cutting position by means of a positive locking device, and tool attachments may be placed on or taken off the arbor of the motor in a few seconds.

The De Walt Woodworker is portable, and can be easily handled by two men. It is provided with a two- or three-phase, 5 h.p. motor, which is so designed that it can deliver the maximum power with but little rise in temperature.

Complete descriptive circulars and price lists may be obtained by writing to the De Walt Products Corporation at Leola, Pa.

NEW BECKWITH ELECTRIC LEAD-MELTING POTS

The Beckwith Machine Company of Ravenna, Ohio, has issued a descriptive circular, illustrating and describing its new Sta-Warm electric lead-melting pots for school shops.

The Sta-Warm electric lead-melting pot has been constructed for heavy-duty service. It melts lead and keeps it melted at a correct temperature for the best results without any attention or worry. The new patented multiple heating circuits distribute the heat evenly on all sides, while a simple device allows the contents to be poured either to the right or to the left.

Complete information and prices may be obtained by any shop instructor upon request.

NEW THURSTON CATALOG OF HARD-TO-GET MATERIALS

The Thurston Manual Training Supply Company of Anoka, Minn., has just issued its new 1929–30 catalog of hard-to-get materials for manual-training schools and instructors.

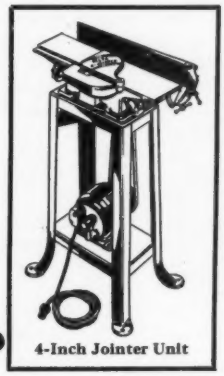
The catalog, which contains 63 pages, illustrates and describes a variety of supplies for the manual-training shop, including upholstery, lamp, art fiber, electrical hardware, and wood-finishing supplies.

Complete information and prices will be sent to any school-instructor upon request.

(Continued on Page 39a)

Announcing The New "1930" Models "Delta" Woodworking Units

PRACTICAL DESIGN — DEPENDABLE QUALITY
PLUS MANY EXCLUSIVE FEATURES



4-Inch Jointer Unit

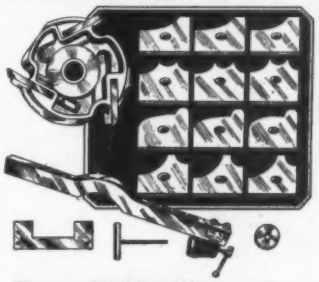
The introduction of the Delta Jointer and Circular Saw Units marks a new era in moderate-priced woodworking equipment. Now, for the first time, are available sturdy, practical machines in compact, convenient form at price levels astonishingly low. The new Delta Units include:

1. Combination 4" Jointer and 8" Circular Unit.
2. 4" Jointer Unit.
3. 8" Circular Saw Unit.

Our New Moulding Cutter
Cuts Over 50 Moulding Shapes With Only 4 Sets of Blades

Interchangeable high speed blades produce over 10,000 cuts per minute at 3500 RPM. Blades require no individual adjustment. Quickly and easily locked in position. Special guide fence. Unusually low price.

New "DELTA" Moulding Cutter



There is Nothing Like It on the Market Today

Mail Coupon Today

No Obligation

DELTA SPECIALTY COMPANY, Dept. M-110
Div. of "Delta Manufacturing Co."
1661-67 Holton St., Milwaukee, Wis.

Please send me FREE, illustrated literature describing 1930 model "Delta" Woodworking Units.

Name.....

Address.....

.....

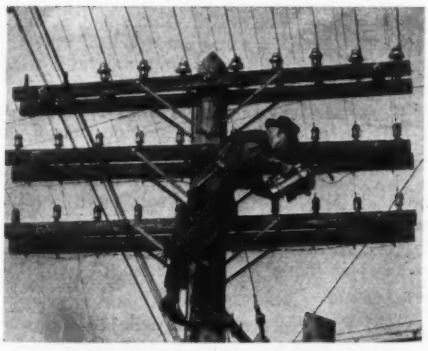
Delta Specialty Co.
Division of
DELTA MANUFACTURING CO.
1661-67 Holton St. Milwaukee, Wis.

Patent Pending—Patented Jan. 1, 1929

(Continued from Page 36a)

A HANDY SOLDERING TORCH

Of interest to the teacher of electricity is the picture shown herewith, showing a lineman making use of a small presto-light tank containing acetylene which, with its torch, makes soldering, splicing, wiping, and other wire or cable operations possible under adverse conditions. These small outfits are easily put into action. No preheating is necessary. The gas is turned on, the torch is lit, and the outfit is ready for business. Since there are more than 15,000 gas exchange stations throughout the country, it is a simple matter to exchange a full tank for an empty one. They are manufactured by the Linde Air Products Company, and information about them can be obtained from their Technical Publicity Department, 205 East 42nd St., New York City.



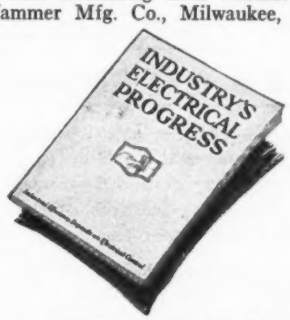
NEW MORSE DIE MAKER'S REAMER

The Morse Twist Drill & Machine Company, of New Bedford, Mass., has issued its new No. 678 die maker's reamer, which has been designed especially for die maker's use. The taper on the reamer is ¾ deg. included angle. This is approximately .013 in. per inch which has been found a suitable angle of clearance for die work.

The new reamer is especially fine for laying out dies where holes are drilled close together to outline the desired shape. The reamer is then used to ream out the holes until they run together, allowing the central piece to drop out. The reamer can then be run along the outline of the die as a spiral mill, thus finishing the die and giving it the proper clearance at one operation. The rapid action of the reamer, its strength and its freedom from chip clogging, are three of its valuable features.

INDUSTRY'S ELECTRICAL PROGRESS

This interesting little booklet is issued by the Cutler-Hammer Mfg. Co., Milwaukee, Wis. It contains much of interest to the teacher of electricity and furnishes him with a great deal of related information for his classes. It shows the rise of the use of electrical power in industry and shows interesting applications of automatic electric controlling devices, motor controllers, and motor installations.



NEW SIMONDS HACK-SAW BLADE

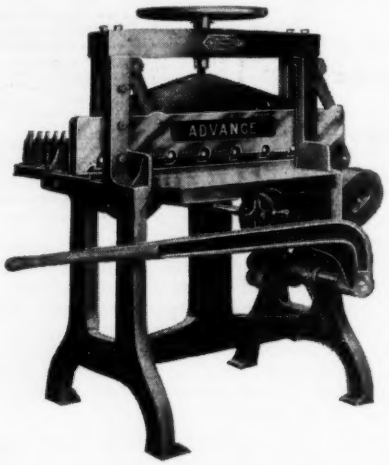
The Simonds Saw and Steel Co., of Fitchburg, Mass., has just placed a new hack-saw blade on the market under the trade name "Red Streak."

The development of this new blade is the result of a year's study on the part of the firm's research department. Its chief advantages are its fine tooth shape which is able to stand up under severe cutting conditions, and its adaptability for hand and power-machine use. Each blade is distinctively marked with a red end, which adds much to the ease with which the blade may be selected for special use. The "red streak" high-speed steel saw is especially useful for production metal cutting.

"It's a Challenge" Sells the Trade

"It's a Challenge" is just about all a modern printer wants to know to make a confident choice of printing equipment or accessories. For more than a third of a century these simple words have been synonymous of high quality and exceptional service everywhere in the industry.

Invest in the best. Write for prices and particulars on the Lee Two-Revolution Press, Diamond Paper Cutters, McGreal Chases, Proof Presses, Imposing Tables, Galleys and other printers' equipment.



Advance Lever Paper Cutters Give More Power and Accuracy

Powerful compound leverage — interlocking back-gauge easily adjusted—half-inch cutting stick with facilities for easy removal—extra-long side-gauges. These are features of the old reliable Advance Lever Paper Cutters.

The "E-Z" Cutter is made in four sizes: 16, 19, 26½ and 30½ inch sizes.

Traditional Challenge quality throughout. Designed for speed, accuracy and economical service. Write today for prices and literature.

The Challenge Machinery Co.

Chicago Grand Haven, Michigan New York

5-16

AMONG the INDUSTRIAL ARTS TEACHERS

Mr. C. F. Criley has assumed his duties as director of the new trade school at Owensboro, Ky. Mr. Elmer Gilbert is instructor in automotive mechanics at this school.

Mr. E. J. Ryd has been appointed as itinerant instructor in painting and decorating for the Fox River Valley vocational schools.

Miss Anne S. Davis, director of vocational guidance for the Chicago public schools, has been made chairman of the committee on vocational guidance and child labor for the next White House conference on child health.

Mr. Fred Weller, of Warrensburg, Mo., has taken up his duties as director of manual training at Arlington Heights, Ill. He will have charge of the boys' athletics also.

Mr. G. W. Olsen, of Gladstone, Mich., has joined the high-school teaching staff as teacher of manual training at Howell.

Mr. C. F. H. Wuesthoff has accepted the position of director of vocational education in Warren county, Warren, Pennsylvania.

Mr. W. A. Ross, formerly state supervisor of vocational agriculture in Wyoming, has accepted a position on the staff of the Federal Board for Vocational Education at Washington, D. C.

Mr. Roscoe Lovell will teach manual training in the high school, at Swampscott, Mass.

Mr. F. H. Shaughnessy has been appointed as instructor in manual training at Edwardsville, Pa.

Miss Merle Irwin has taken up her duties as vocational adviser in the Lindblom High School, Chicago, Ill.

Mr. Charles S. Siskind, formerly of the electrical department of the Milwaukee Vocational School, Milwaukee, Wis., has accepted a position as assistant professor in the electrical-engineering department of Purdue University, La-Fayette, Ind.

Mr. H. R. Filson, of Harrison, Mont., has been appointed as head of the department of aeronautics in the automotive trades school, Cincinnati, Ohio. Mr. Filson, who has more than one thousand hours of flying to his credit, has been very successful in his ground-school work and has had nine years' experience in high-school education. He served eighteen months in the army.

The enrollment at the Automotive Trades School this year, has been unusually large. The day school has enrolled 373 boys between the ages of 14 and 21, and the regular four-year course has attracted 108 boys. One group of 25 boys has entered upon the second year of its studies.

Mr. Baxter E. Hart, instructor in carpentry at the Building Trades School, Cincinnati, Ohio, died at his home on September 20, following a sudden attack of illness. Mr. Hart was an authority in his field and was well liked by the students and teachers in the school.

Mr. C. L. Hill, formerly at the High School, Caney, Kans., will teach woodworking and mechanical drawing at the Eugene Field School, Tulsa, Okla.

Mr. F. C. Gerhart, who formerly taught printing at the High School, Logansport, Ind., will teach printing at the Central High School, Tulsa, Okla.

Mr. Earl McMahon, who formerly taught at Ponca City, Okla., will teach metal work at the Vocational School, Tulsa, Okla.

Vocational Expenditures Large in Alabama

The sum of $469,941 was spent for vocational education work in Alabama last year, against $400,910 the year before, according to a recent statement of the state education department. Of the total amount, the state supplied $209,428, and the Federal department $151,500. In 1927, the state supplied $156,797, and the government $143,720.

Built for Printers—

Discovered by Art Supervisors and Printing Instructors—

Filling the frequent wish for a simple, safe, inexpensive means of printing things—

A Portable Proof Press . . . An Art Press for printing from linoleum blocks and for making prints of etchings . . . A compact, portable printing press that will take large forms and print on large sheets . . . A Show Card, Bulletin and Poster printing press . . . An All-Purpose Press for the amateur or professional for printing nominal quantities of anything from a business card to a full page of an 8-column newspaper.

So simple a boy or girl can operate it safely and with a craftsman's results.

The
FREMONT
PORTABLE
General Utility Printing Press

$22.50 *Conveniently Low Prices* $42.50
Unusually Large Printing Areas

Model A prints anything up to 9 x 12", on paper up to 9 x 16", **$22.50**
Model B prints anything up to 11 x 16", on paper up to 11 x 20", **27.50**
Model C prints anything up to 9 x 22", on paper up to 9 x 27", **33.50**
Model D prints anything up to 18 x 22", on paper up to 18 x 27", **42.50**

Inking Outfit, comprising hand ink roller, ink distributing plate, and supply of high grade black ink in dustproof steel drawer-box, **$3.00.**

Sheet Feed and Paper Registering Device, semi-automatically feeds paper or cards to perfect register for one or two color work, including quick-locking chase, **$8.50.**

Auxiliary Etching Base for making prints from copper or celluloid etchings, **$2.00.**

Low cost is the result of simplicity and modern engineering principles. Built like a steel bridge . . . Capable of the hardest use . . . Convenience and results unbelievable until seen . . . *Prints from* anything without skill or experience. *Prints on* anything from tissue to heavy box board.

FACULTIES and officials months ago discovered the worth of the Fremont for its many school uses, but only now have manufacturing facilities reached the point where it could be announced outside the printing industry.

Less than a year on the market, but already in thousands of print shops, newspaper plants, advertising agencies, schools, offices and homes! Enthusiastically welcomed by those whose business is printing as well as by those who teach it, and those whose hobby is printing, etching, or linoleum block artistry. The reason is plain: A cylinder press, simplified and made portable, purposely priced ridiculously low to make it available to the greatest number. With one in your school there would be a greater measure of the joy of accomplishment in art and printing.

Order from your dealer or direct from the manufacturers

FREMONT EQUIPMENT COMPANY, 4525 — 38th Street, LONG ISLAND CITY, N. Y.

Now Available

"The Greatest book of its kind ever produced for student or teacher in the wood working classes."

Hundreds of letters have come to us in response to the distribution of the Author's Edition of "The Book of Projects."

Teachers and students alike have been enthusiastic in their praise. What we thought was a good effort turned out to be something greater.

Thirty-three pages of projects with complete drawings—thirteen pages devoted to ornamentation—beautifully printed—text clear and simple to understand—

Truly a book that will raise the standard of vocational work in the school and home.

"It should be in the hands of every teacher and student for every day reference—"

Still a few copies left for complimentary distribution to teachers and heads of wood working instruction who write us on school stationery.

Priced at only one dollar for general distribution.

KLISE MANUFACTURING COMPANY

Grand Rapids Michigan.

NEWS AND NOTES

Survey of Building Trades in Seattle, Wash.

The school board of seattle, Wash., has adopted a recommendation of Supt. T. R. Cole providing for a survey of the building trades. The committee will comprise two members of the Seattle construction council, two members of the central labor council, and three members of the schools to be appointed by the board of education. The survey will be productive of results which will lead to a more comprehensive trade-school program.

Model Airplane Building in Toledo High Schools

The building and flying of model airplanes has become an interesting part of the manual-arts work in the high schools at Toledo, Ohio. At the Waite High School, a variety of models have recently been constructed, including the DeHaviland, the Fokker, and NC4. All of the models rise from their own power and are built to fly from 500 to 800 feet.

The work has been found invaluable for teaching mechanical workmanship, ability to read and interpret plans, and for obtaining a knowledge of airplanes and their construction and operation.

Vocational School on Twelve-Month Basis

The school board of St. Louis, Mo., has ordered that the vocational school be placed on a twelve-month full-time basis. The school year will consist of three terms, two of twenty weeks each, and one of ten weeks. The school will be in session five days each week, and on Saturday morning from 8 to 12. The school day for individual teachers will consist of 5½ hours of actual schoolwork, in addition to 30 minutes for luncheon which is allowed all teachers and students.

Vocational Placement Service at Portland, Oreg.

A vocational placement bureau has been opened in the school-administration building at Portland, Oreg. The bureau will secure part-time work for pupils unable to finish their school courses, and full-time work for those who find it impossible to remain in school.

Airplane Service Course for Boston Trade School

An airplane service course has been introduced in the Boston Trade School at Boston, Mass.

New Pottstown School Has Hobby Hall

The new $300,000 building for the Hill School, Pottstown, Pa., is the gift of Mrs. Alexander H. Rice, and is being erected to allow students to cultivate their hobbies. The building is being equipped with a variety of scientific pieces, from steam engines to telescopes, to give boys an opportunity to learn by playing. It is planned to provide small, well-equipped laboratories where the boys may work on experiments beyond those conducted in the regular classes and in laboratory exercises. It is believed that these incentives will do much to awaken scientific curiosity which may be developed further in the institution which the student may later enter.

U. S. Department of Agriculture Produces "Talkies."

The U. S. Department of Agriculture has begun plans for the production of "talkies" to be offered in connection with livestock shows next winter. For the present, the talking films will be limited to short special occasions such as the national dairy show, where facilities can be provided for reproduction. The officials of the bureau of agricultural economics of the department have recognized the value of vocationalizing films dealing with economic phases of farming, because the exhibition of sound pictures on agricultural topics will aid greatly in inducing farmers to study the prospective demand for their products.

Aviation Course at Cincinnati, Ohio

The board of education of Cincinnati has adopted a recommendation of Supt. R. J. Codon providing for a class in aviation to be established under the direction of the city school system. The course will be given through the automotive trades school, at night, and will include such subjects as history and nomenclature, aircraft construction, aircraft rigging, aircraft instruments, aircraft engines, aerodynamics, meterology, and air navigation. While the course will include a study of aviation groundwork, construction, and engine work, it will not include instruction in flying.

Vocational-Guidance Work at Long Beach, Calif.

The school board of Long Beach, Calif., has introduced vocational guidance in the Jefferson Junior High School for 350 students in various lines of work.